Seabrook Station
License Renewal Application

NEXTera ENERGY SEABROOK

LICENSE RENEWAL APPLICATION

NEXTERA ENERGY SEABROOK, LLC, ET AL.*

DOCKET NO. 50-443

SEABROOK STATION, UNIT NO. 1

FACILITY OPERATING LICENSE No. NPF-86

* NextEra Energy Seabrook, LLC, is authorized to act as agent for the: Hudson Light & Power Department, Massachusetts Municipal Wholesale Electric Company, and Taunton Municipal Lighting Plant and has exclusive responsibility and control over the physical construction, operation and maintenance of the facility.

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CHAPTER 1

ADMINISTRATIVE INFORMATION

1.0 ADMINISTRATIVE INFORMATION

Pursuant to Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR 54), *"Requirement for Renewal for Operating Licenses for Nuclear Power Plants",* this application seeks renewal for an additional 20-year term of the NextEra Energy Seabrook, LLC facility operating license for Seabrook Station Unit 1.

Operating license (NPF-86) currently expires at midnight, March 15, 2030. This application includes renewal of the source, special nuclear and byproduct materials licenses that are combined in the facility operating license. The application is based on the guidance provided by the U. S. Nuclear Regulatory Commission (NRC) in NUREG-1800, *"Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants"* and Regulatory Guide 1.188, *"Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses"* which endorses the guidance provided by NEI 95-10, *"Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule"*.

The license renewal application (LRA) is intended to provide sufficient information for the NRC to complete its technical and environmental reviews pursuant to 10 CFR Part 54 *"Requirement for Renewal for Operating Licenses for Nuclear Power Plants"* and 10 CFR Part 51, *"Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions"*. The LRA is provided to meet the standards required by 10 CFR 54.29 in support of the issuance of a renewed operating license for Seabrook Station Unit 1.

1.1 GENERAL INFORMATION

The following is general information required by 10 CFR 54.17 and 10 CFR 54.19.

1.1.1 NAME OF APPLICANT

NextEra Energy Seabrook, LLC (NextEra Energy Seabrook)

NextEra Energy Seabrook owns 88.2% of Seabrook Station. The remaining portion is owned by the following municipal utilities in Massachusetts: Massachusetts Municipal Wholesale Electric Company, Taunton Municipal Lighting Plant, and Hudson Light & Power Department. NextEra Energy Seabrook, LLC is a subsidiary of FPL Group, Inc. based in Juno Beach, Florida. NextEra Energy Seabrook is the licensed operator of Seabrook Station Unit 1.

1.1.2 ADDRESSES OF APPLICANTS

Owner's Address

NextEra Energy Seabrook, LLC
700 Universe Boulevard
Juno Beach, FL 33408-0420

Other Owners and Addresses

Massachusetts Municipal Wholesale Electric Company
Moody Street, P.O. Box 426
Ludlow, MA 01056

Taunton Municipal Lighting Plant
55 Weir Street
Taunton, MA 02780

Hudson Light & Power Department
49 Forest Avenue
Hudson, MA 01749

Address of the Site

Seabrook Station
NextEra Energy Seabrook, LLC
626 Layfayette Road
Seabrook, NH 03874

1.1.3 DESCRIPTION OF BUSINESS OF APPLICANT

NextEra Energy Seabrook is engaged principally in the business of generating electricity for sale on the wholesale market.

1.1.4 LEGAL STATUS AND ORGANIZATION

NextEra Energy Seabrook, a Delaware limited liability company, is a direct, wholly owned subsidiary of ESI Energy, LLC, which is a direct, wholly-owned subsidiary of NextEra Energy Resources, LLC. NextEra Energy Resources, LLC is in turn, a direct-wholly owned subsidiary of FPL Group Capital, Inc, which is a direct wholly-owned subsidiary of FPL Group. FPL Group is a public utility holding company incorporated in 1984 under the laws of the state of Florida. NextEra Energy Seabrook is not owned, controlled, or dominated by any alien, foreign corporation, or foreign government. NextEra Energy Seabrook makes this application on their own behalf and on behalf of the other co-owners and is not acting as an agent or representative of any other person. All persons listed are United States citizens. NextEra Energy Seabrook does not have a Board of Directors.

NextEra Energy Seabrook is authorized to act as agent for Massachusetts Municipal Wholesale Electric Company, Taunton Municipal Lighting Plant and Hudson Light & Power Department and has exclusive responsibility and control over the physical construction, operation and maintenance of the facility.

NextEra Energy Seabrook – Principal Officers

T. J. Tuscai
President
700 Universe Boulevard
Juno Beach, FL 33408-0420

Michael O’Sullivan
Senior Vice President
700 Universe Boulevard
Juno Beach, FL 33408-0420

Manoochehr K. Nazar
Senior Vice President and Chief Nuclear Officer
700 Universe Boulevard
Juno Beach, FL 33408-0420

Ronald L. Scheirer
Vice President
700 Universe Boulevard
Juno Beach, FL 33408-0420

Mark R. Sorensen
Treasurer
700 Universe Boulevard
Juno Beach, FL 33408-0420

Charles S. Schultz
Secretary
700 Universe Boulevard
Juno Beach, FL 33408-0420

Rita W. Costantino
Assistant Secretary
700 Universe Boulevard
Juno Beach, FL 33408-0420

Judith J. Kahn
Assistant Treasurer
700 Universe Boulevard
Juno Beach, FL 33408-0420

Massachusetts Municipal Wholesale Electric Company - Officers

Peter Dion
President and General Manager
c/o Nancy A. Brown
Moody Street, P.O. Box 426
Ludlow, MA 01056

Ronald C. DeCurzio
Chief Executive Officer,
Chief Financial Officer and Secretary
Moody Street, P.O. Box 426
Ludlow, MA 01056

James B. Kline
Treasurer
Moody Street, P.O. Box 426
Ludlow, MA 01056

Nicholas J. Scobbo, Jr.
General Counsel
c/o Nancy A. Brown
Moody Street, P.O. Box 426
Ludlow, MA 01056

Nancy A. Brown
Assistant Secretary
Moody Street, P.O. Box 426
Ludlow, MA 01056

Kelly R. Joyce
Assistant Treasurer
Moody Street, P.O. Box 426
Ludlow, MA 01056

Taunton Municipal Lighting Plant – Commissioners

Peter H. Corr
Chairman
55 Weir Street
Taunton, MA 02780

David Westcoat
Secretary
55 Weir Street
Taunton, MA 02780

Joseph Martin
Commissioner
55 Weir Street
Taunton, MA 02780

Hudson Light & Power Department – Board

Joseph J. Marinelli
Chairman
49 Forest Avenue
Hudson, MA 01749

Paul Huehmer
Clerk
49 Forest Avenue
Hudson, MA 01749

Roland L. Plante
Board Member
49 Forest Avenue
Hudson, MA 01749

1.1.5 CLASS AND PERIOD OF LICENSE SOUGHT

NextEra Energy Seabrook requests renewal of the Class 103 operating license for Seabrook Station (Facility Operating License NPF-86) for a period of 20 years beyond the expiration of the current license. This would extend the operating license from midnight, March 15, 2030, to midnight, March 15, 2050. This application includes a request for renewal of those NRC source material, special nuclear material, and by-product material licenses included within the current operating license and issued pursuant to 10 CFR 30, *“Rules of General Applicability to Domestic Licensing of Byproduct Material”*, 10 CFR 40, *“Domestic Licensing of Source Material” and 10 CFR 70, “Domestic Licensing of Special Nuclear Material”*.

1.1.6 ALTERATION SCHEDULE

NextEra Energy Seabrook does not propose to construct or alter any production or utilization facility in connection with this renewal application. The current licensing basis (CLB) will be continued and maintained throughout the period of extended operation (PEO).

1.1.7 REGULATORY AGENCIES WITH JURISDICTION

New Hampshire Nuclear Decommissioning Finance Committee
21 South Fruit Street, Suite 10
Concord, NH 03301-2429

1.1.8 LOCAL NEWS PUBLICATIONS

News publications which circulate in the area surrounding NextEra Energy Seabrook and are considered appropriate to give reasonable notice of this renewal application to those municipalities, private utilities, public bodies and cooperatives that might have a potential interest in the facility, include the following:

Exeter News-Letter
111 New Hampshire Avenue
Portsmouth, NH 03801

Hampton Union
111 New Hampshire Avenue
Portsmouth, NH 03801

Portsmouth Herald
111 New Hampshire Avenue
Portsmouth, NH 03801

Manchester Union Leader
Loeb Drive
PO Box 9555
Manchester, NH 03108-9555

Foster’s Daily Democrat
150 Venture Drive
Dover, NH 03820

The Daily News
23 Liberty Street
Newburyport, MA 01950

Boston Globe
135 Morrissey Boulevard
P.O. Box 55819
Boston, MA 02125

Boston Herald
One Herald Square
Boston, MA 02118

1.1.9 CONFORMING CHANGES TO STANDARD INDEMNITY AGREEMENT

The requirements of 10 CFR 54.19(b) state 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 No. B-106 for Seabrook Station states that the agreement shall terminate at the time of expiration of the license.

The indemnity agreement lists NPF-86 as the applicable license number. Should the license number be changed upon issuance of the renewed license, NextEra Energy Seabrook requests that conforming changes be made to the indemnity agreement to include the extended period.

1.1.10 RESTRICTED DATA AGREEMENT

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

1.2 PLANT DESCRIPTION

Seabrook Station is located in the Town of Seabrook, Rockingham County, New Hampshire, on the western shore of Hampton Harbor, two miles west of the Atlantic Ocean. The Station is approximately two miles north of the Massachusetts state line and approximately 15 miles south of the Maine state line. The site consists of 889 acres divided into two lots. Lot 1, which is owned by the Seabrook Station joint owners, is approximately 109 acres and holds most of the operating facility. Lot 2, which is owned by NextEra Energy Seabrook, is approximately 780 acres and consists mainly of natural areas.

Seabrook Station is a single unit 1,245 net megawatts electric Westinghouse 4-loop pressurized water reactor with a turbine generator built by General Electric. A zero power license was granted to the facility in October 1986 and a full power operating license was subsequently granted on March 15, 1990. Seabrook Station previously sought and received a modification to the expiration of the facility operating license to recapture the time licensed at zero percent power. Commercial operation began in August 1990 with a design rated power of 3411 megawatts thermal (MWt). Two power uprates have been implemented since initial commercial operation. In cycle 11, the rated thermal power was increased to 3587 MWt and in cycle 12, the rated thermal power was increased to 3648 MWt.

Seabrook Station's reactor is housed in a steel lined reinforced concrete containment structure which is enclosed by a reinforced concrete containment enclosure structure. Two three-mile-long tunnels bring water to and from the Atlantic Ocean for cooling and other plant systems. Other site structures include the Primary Auxiliary Building, Fuel Storage Building, Waste Processing Building, Control and Turbine Building, Diesel Generator Building, Administration and Service Building, Ocean Intake Structure, Ocean Discharge Structure, Circulating Water Pump House and the Service Water Pump House.

Originally two identical units were to be built on the site, but construction of Unit 2 was effectively terminated in 1984 when it was approximately 25 percent complete and the construction permit subsequently expired in October 1988.

1.3 TECHNICAL INFORMATION REQUIRED FOR AN APPLICATION

In accordance with 10 CFR 54.21, each application for a renewed operating license must contain the following information. These are an integrated plant assessment (IPA) (Chapters 2.0, 3.0 and Appendix B), CLB changes during NRC review (Section 1.4), an evaluation of time-limited aging analyses (TLAA) (Chapter 4.0), and a supplement to the Seabrook Station Updated Final Safety Analysis Report (UFSAR) that contains a summary description of the programs and activities for managing the effects of aging and the evaluation of the TLAA (Appendix A).

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 (Appendix D). There were no Technical Specification Changes identified necessary to manage the effects of aging during the period of extended operation. Also, 10 CFR 54.23 requires the application to include a supplement to the Environmental Report (Appendix E). Appendix C is optional and is not used by Seabrook Station.

The integrated plant assessment, as defined by 10 CFR 54.3, is a licensee assessment that demonstrates that a nuclear power plant facility's structures and components requiring aging management review in accordance with 10 CFR 54.21(a) for license renewal have been identified. The integrated plant assessment also demonstrates that the effects of aging on the functionality of such structures and components will be managed to maintain the CLB during the period of extended operation (PEO). The Seabrook Station integrated plant assessment includes:

- identification of the structures and components within the scope of license renewal that are subject to an aging management review;
- identification of the aging effects applicable to these structures and components;
- identification of programs and activities that will manage these identified aging effects; and
- a demonstration that these programs and activities will be effective in managing the effects of aging during the period of extended operation.

The Seabrook Station integrated plant assessment 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 Seabrook Station integrated plant assessment is documented with site-specific reports and calculations that were generated in accordance with the FPL and Seabrook Station Quality Assurance Programs.

Time Limited Aging Analyses (TLAA) are analyses that are explicitly based on the current operating term of the facility. 10 CFR 54 requires exemptions based on TLAAs that are identified and analyzed to justify continuation of these exceptions into the PEO.

For each TLAA, it has been demonstrated that the TLAA remains valid for the PEO, or the analysis has been projected to the end of PEO, or that the effects of aging will be adequately managed for the PEO.

An UFSAR supplement has been developed containing a summary description of the programs and activities for managing the effects of aging and an evaluation of the TLAAs for the PEO.

1.4 CURRENT LICENSING BASIS CHANGES DURING NRC REVIEW

Each year, following the submittal of the NextEra Energy Seabrook LRA and at least three months before the scheduled completion of the NRC review, NextEra Energy Seabrook will submit an amendment to the application pursuant to 10 CFR 54.21(b). This submittal will identify any changes to the CLB that materially affect the contents of the LRA, including the UFSAR supplement and any other aspects of the application.

1.5 CONTACT INFORMATION

Any notices, questions, or correspondence in connection with this filing should be directed to:

Mr. Paul Freeman
Site Vice President
NextEra Energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

With copies to:

Richard R. Cliche
License Renewal Project Manager
NextEra Energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

Michael O'Keefe
Licensing Manager
NextEra Energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

Steven Hamrick, Esq.
NextEra Energy Seabrook, LLC
801 Pennsylvania Ave. NW Suite 220
Washington DC 20004

1.6 GENERAL REFERENCES

- 10 CFR 50, *Domestic Licensing of Production and Utilization Facilities*
- 10 CFR 51, *Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions*
- 10 CFR 54, *Requirements for Renewal of Operating Licenses for Nuclear Power Plants*
- NUREG-1800, *Standard Review Plan (SRP) for Review for License Renewal Applications for Nuclear Power Plants*, Revision 1, September 2005
- NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volumes 1 and 2, Revision 1, September 2005
- Regulatory Guide 1.188, *Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses*, Revision 1, September 2005
- NEI 95-10, *Industry Guidelines for Implementing the Requirements of 10 CFR 54 – The License Renewal Rule*, Revision 6, June 2005

1.7 ACRONYMS

AC	Alternating Current
ACI	American Concrete Institute
AMP	Aging Management Program
AMR	Aging Management Review
ANSI	American National Standards Institute
ART	Adjusted Reference Temperature
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	Anticipated Transient Without Scram
CAP	Corrective Action Program
CASS	Cast Austenitic Stainless Steel
CCCW	Closed Cycle Cooling Water
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CLB	Current Licensing Basis
CMAA	Crane Manufacturers Association of America
CPVC	Chlorinated Poly-Vinyl Chloride
CRD	Control Rod Drive
CRUD	Chalk River Unidentified Deposits
CUF	Cumulative Usage Factor
DBD	Design Basis Document
DC	Direct Current
EAF	Environmentally Assisted Fatigue

ECCS	Emergency Core Cooling System
EDB	Equipment Database
EFPY	Effective Full Power Years
EOL	End of Life
EPDM	Ethylene Propylene Dienyl Monomer
EPRI	Electric Power Research Institute
EPRI-MRP	Electric Power Research Institute Materials Reliability Program
EQ	Environmental Qualification or Environmentally Qualified
ET	Eddy Current Testing
FAC	Flow-Accelerated Corrosion
F_{en}	Environmental Factor
FP	Fire Protection
FSAR	Final Safety Analysis Report
GALL	Generic Aging Lessons Learned
GL	Generic Letter
GSI	Generic Safety Issue
GSU	Generator Step up Transformer
HELB	High Energy Line Break
HEPA	High Efficiency Particulate Absorber
HVAC	Heating, Ventilation, and Air Conditioning
I&C	Instrumentation and Controls
IASCC	Irradiation Assisted Stress Corrosion Cracking
IGSCC	Intergranular Stress Corrosion Cracking
INPO	Institute of Nuclear Power Operations

IPA	Integrated Plant Assessment
IR	Insulation Resistance
ISG	Interim Staff Guidance
ISI	Inservice Inspection
kV	Kilovolts
kW	Kilowatts
LBB	Leak Before Break
LLC	Limited Liability Company
LOCA	Loss of Coolant Accident
LRA	License Renewal Application
LTOP	Low Temperature Overpressure
LWR	Light Water Reactor
MEB	Metal Enclosed Bus
MEQ	Mechanical Equipment Qualification
MeV	Million Electron Volts
MIC	Microbiologically-Influenced Corrosion
MRULE	Maintenance Rule
MWe	Megawatts Electric
MWt	Megawatts Thermal
NDE	Nondestructive Examination
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NPS	Nominal Pipe Size
NRC	Nuclear Regulatory Commission

NSAC	Nuclear Safety Analysis Center
NSAS	Non-Safety Affecting Safety
NSSS	Nuclear Steam Supply System
NUMARC	Nuclear Utility Management and Resources Council
ODSCC	Outer Diameter Stress Corrosion Cracking
OE	Operating Experience
OBE	Operating Base Earthquake
P&ID	Piping and Instrument Diagram
P-T	Pressure – Temperature
PEO	Period of Extended Operation
PORV	Power Operated Relief Valve
PTS	Pressurized Thermal Shock
PVC	Poly-vinyl Chloride
PVDF	Polyvinylidene Fluoride
PWR	Pressurized Water Reactor
PWSCC	Primary Water Stress Corrosion Cracking
RAT	Reserve Auxiliary Transformer
RCPB	Reactor Coolant Pressure Boundary
RCP	Reactor Coolant Pump
RG	Regulatory Guide
RMUWST	Reactor Makeup Water Storage Tank
RPV	Reactor Pressure Vessel
RT_{NDT}	Reference Temperature – NIL Ductility Transition
RT_{PTS}	Reference Temperature – Pressurized Thermal Shock

RV	Reactor Vessel
RWST	Refueling Water Storage Tank
SBO	Station Black out
SCC	Stress Corrosion Cracking
SER	Safety Evaluation Report
SF_6	Sulfur Hexafluoride
SO_2	Sulfur Dioxide
SR	Safety-Related
SRP	Standard Review Plan
SS	Stainless Steel
SSC	Systems, Structures, and Components
SSE	Safe Shutdown Earthquake
SWG	Switchgear
TLAA	Time Limited Aging Analysis
UAT	Unit Auxiliary Transformer
UT	Ultrasonic Testing
UFSAR	Updated Final Safety Analysis Report
USE	Upper Shelf Energy
WCAP	Westinghouse Commercial Atomic Power
w.g.	Water Gauge

CHAPTER 2

SCOPING AND SCREENING METHODOLOGY FOR IDENTIFYING SYSTEMS, STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW, AND INPLEMENTATION RESULTS

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

This chapter describes the process required by 10 CFR Part 54 for the identification of structures and components subject to an aging management review in the Seabrook Station integrated plant assessment (IPA). For those systems, structures, and components within the scope of license renewal, §54.21(a)(1) requires a license renewal applicant to identify and list the structures and components subject to an aging management review. Furthermore, §54.21(a)(2) requires that methods used to identify and list these structures and components be described and justified. The technical information in this chapter serves to satisfy these requirements.

Seabrook Station's plant assessment methodology follows the approach recommended in Nuclear Energy Institute (NEI) 95-10. The methodology consists of scoping, screening, and aging management reviews. The methodology is implemented in accordance with FPL/NextEra Energy Quality Assurance Program.

The scoping and screening methodology is described in License Renewal Application (LRA) Section 2.1. The results of the plant level scoping to identify the systems and structures within the scope of license renewal are contained in LRA Section 2.2. The results of the scoping and screening of the mechanical, structural and electrical components subject to an aging management review are contained in LRA Section 2.3 for mechanical systems, LRA Section 2.4 for structures, and LRA Section 2.5 for electrical and instrumentation and control systems.

The operating license application and original FSAR for Seabrook Station contemplated two identical units on a single site. Construction on Seabrook Station Unit 2 was terminated in 1984 and its construction permit was allowed to expire in October 1988. The updated FSAR eliminates all references to Unit 2 except for a few cases where it was necessary to maintain a Unit 2 reference to provide an accurate description of a plant feature.

2.1 SCOPING AND SCREENING METHODOLOGY

This section describes the scoping and screening process used at Seabrook Station to identify systems, structures and components (SSCs) subject to aging management review. The following sections provide details of how the "Scoping" and "Screening" process was implemented.

"Scoping" was performed to identify the plant systems and structures which perform intended functions as defined in 10 CFR 54.4(a)(1), (a)(2) or (a)(3). Initially, all Seabrook Station SSCs were examined. If any portion of a system or structure met the scoping criteria of 10 CFR 54.4, the system and/or structure was included in-scope for License Renewal. For systems and structures determined to be in scope, the intended functions were identified. A simplified flowchart of the Seabrook Station scoping process is depicted in Figure 2.1-1. All electrical and Instrumentation and Control systems and components are considered in scope.

"Screening" was performed to identify the components associated with the in-scope systems and structures that are subject to aging management review as defined in 10 CFR 54.21. The screening process examined in-scope components and structures to determine those that are passive and long-lived. These components and structures were subject to aging management review. A simplified flowchart of the Seabrook Station screening process is depicted in Figure 2.1-2.

Scoping and screening has been performed consistent with the requirements of 10 CFR 54, the Statements of Consideration related to the license renewal rule, and the guidance provided in NEI 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule, Revision 6".

Seabrook Station license renewal project procedures provide detailed instructions for these processes. The procedures incorporate the guidance provided in NEI 95-10. In addition, Seabrook Station developed technical reports to provide guidance on specific topics associated with the criteria of 10 CFR Part 54.

Section 2.1.1 provides the regulatory requirements from 10 CFR 54 applicable to the scoping and screening process.

Section 2.1.2 discusses the Seabrook Station scoping methodology.

Section 2.1.3 discusses the Seabrook Station screening methodology.

Section 2.1.4 discusses consideration of the NRC staff's license renewal interim staff guidance (ISG) documents in the Seabrook Station application.

Section 2.1.5 discusses the evaluation of Generic Safety Issues (GSIs).

Section 2.1.6 provides conclusions for Section 2.1.

2.1.1 REGULATORY REQUIREMENTS

Scoping

Criteria for determining which SSCs should be reviewed and evaluated for inclusion in the scope of license renewal (LR) is provided in 10 CFR 54.4(a)(1)-(3). Specifically, 10 CFR 54.4 states:

(a) Plant SSCs within the scope of this part are--

(1) Safety-related SSCs which are those relied upon to remain functional during and following design basis events (as defined in §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 exposures 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 SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) above.

(3) All SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the NRC'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).

(b) The intended functions that these SSCs must be shown to fulfill in §54.21 are those functions that are the bases for including them within the scope of license renewal as specified in paragraphs (a)(1) - (3) of this section.

Screening:

Criteria used in the screening process at Seabrook Station is defined in 10 CFR 54.21 (a)(1) and (2). Screening determines the systems, structures and components in the scope of license renewal that are subject to aging management review.

Specifically, 10 CFR 54.21 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 §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 §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.

(2) Describe and justify the methods used in paragraph (a)(1) of this section.

(3) For each structure and component identified in paragraph (a)(1) of this section, demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation.

2.1.2 SCOPING METHODOLOGY

General Scoping Process

Scoping is the systematic process that identifies the Seabrook Station SSCs within the scope of the License Renewal rule. Systems, structures and components within the scope of License Renewal are then screened to determine if they require an Aging Management Review (AMR).

The scoping methodology utilized by Seabrook Station is consistent with the guidance provided by NEI 95-10, Revision 6. Existing plant documentation was used for this review including the Updated Final Safety Analysis Report (UFSAR), Technical Specifications and licensing correspondence that collectively form the Seabrook Station Current Licensing Basis (CLB). Additional information sources included Design Basis Documents (DBD's), controlled drawings, Equipment Database and the Maintenance Rule Database.

All Seabrook Station plant systems and structures were reviewed and evaluated against the scoping criteria to determine which met the requirements for inclusion in the scope of license renewal.

Scoping was initially performed at the system or structure level in accordance with the criteria identified in 10 CFR 54.4(a). System level and structure intended functions were then identified from a review of CLB documentation. Starting at the system level intended functions, scoping boundaries for each system were determined. The results of this effort form the basis for identification of the in-scope components.

Component information was initially transferred from the Seabrook Station Equipment Database (EDB) to the License Renewal Database. The EDB is used to maintain configuration control of component level information at Seabrook Station. As such, quality assurance applied to the EDB software ensures compliance with requirements and/or commitments that are necessary to support both safety related and non-nuclear safety component level information.

Use of commodity groups occurred when component evaluations were best performed by component type, rather than by system or structure. NEI 95-10 served as guidance for commodity groupings. Components constructed from similar materials, exposed to similar environments, and which perform similar intended functions form the commodity groups.

Commodity group components were not associated with a specific system or structure during the component's evaluation, but with their assigned commodity group. Evaluation of each commodity group took place as if it were a separate, individual system.

Equipment that is stored on site for use in response to design basis events is considered to be within the scope of License Renewal. At Seabrook Station, Station Blackout and Appendix R fire scenarios utilize stored equipment to facilitate contingency actions following the event. The stored equipment is confirmed available and in good operating condition by periodic inspection. Tools and supplies used to place the stored equipment in service are not in the scope of License Renewal.

Mechanical Scoping

Mechanical scoping utilized existing Maintenance Rule (MRule) system functions during the License Renewal scoping. These functions were transferred into the License Renewal Database from the MRule database.

In addition to the MRule functions, functions were created in the License Renewal Database to capture the non-safety affecting safety (Criterion 2) and the five regulated events (Criterion 3). The MRule system functions that were transferred to the License Renewal Database were validated for accuracy using the UFSAR, Technical Specifications, DBD (including source documents), and other controlled documentation.

Civil/Structural Scoping

Civil controlled drawings and the EDB were used to identify buildings, structures and foundations. The buildings were input into the License Renewal Database as individual or grouped license renewal structures.

Other information sources, such as CLB documentation, were electronically searched using several keywords (e.g., structure, new structure, building modification) to ensure all plant structures were evaluated for license renewal intended functions regardless of their coverage in the plant equipment database.

Electrical Scoping

All electrical and I&C systems were considered in-scope. Electrical and I&C components were organized into commodity groups. The information provided by NEI 95-10 Appendix B and NUREG-1800 Table 2.1-5, was used as a basis for categorizing electrical and I&C components into commodity groups such as insulated cables and connections, circuit breakers, and switches. Individual components were not identified. The electrical commodity groups identified resulted from a review of plant documents;

controlled drawings, the EDB, and interface with the parallel mechanical screening efforts.

Scoping Boundaries

Application of all three 10CRF54.4 criteria generated a listing of SSCs that were determined to be in-scope for license renewal. Not every component of a system supports the system intended functions. Therefore, some components within an in-scope system are not in-scope for license renewal.

For the mechanical scoping effort, summary level boundary descriptions were developed and included in Section 2.3. License Renewal drawings/diagrams were also created from plant controlled PID's (e.g. PID-1-FW-20686) to illustrate in-scope mechanical systems, structures and components subject to an aging management review (AMR). These AMR boundaries are depicted on color coded license renewal drawings (e.g. PID-1-FW-LR20686) and contain system boundary flags. The "RED" colored portions of the drawings indicate system components in scope for criteria (a)(1) and (a)(3) that are subject to an AMR. The "GREEN" colored portions indicate system components in scope for criterion (a)(2) that are subject to an AMR. The "BLACK" lines define those components that are not in scope or screen out and thus, are not subject to an AMR.

Mechanical Component Types are listed in sections 2.3.1, 2.3.2, 2.3.3, and 2.3.4 and in the 3.X.2 Tables of Sections 3.1, 3.2, 3.3 and 3.4 of the LRA. License Renewal Drawing "PID-LRNOTES1" was prepared to help the reviewer in correlation of component types mentioned in the LRA with component numbers identified on the License Renewal Drawings. For example, the term "Piping Element" is used in Table 2.3.2-1. License Renewal Drawing PID-LRNOTES1 provides the tag number correlation for components labeled as Piping Elements (e.g., tag numbers containing "-FE-", "-FG-", "-FI-", "-MM-") and states that this designation refers only to the glass portion of these instrumentation components. Similarly, the term "Instrumentation Element" used in Table 2.3.2-1 can be correlated using "PID-LRNOTES1" to refer to these same instrumentation components, but would include the portions of the instrumentation component other than the glass portion.

For the structural scoping effort, summary level boundary descriptions were developed and included in Section 2.4. Individual License Renewal drawings were not created for structures. A single plot plan drawing was, however, created to depict the in-scope boundaries. The "RED" colored portions of the drawing indicate structures that are in scope for criteria (a)(1). The "BLUE" colored portions indicate structures that are in scope for criterion (a)(2). The "GREEN" colored portions indicate structures that are in scope for criterion (a)(3). "BLACK" colored structures are out of scope.

For the electrical scoping effort, boundary drawings were not necessary since commodity grouping was used in the scoping process. The SBO Offsite Recovery Path License Renewal Drawing, Figure 2.5-1, was created to depict the in-scope portion of the off-site power system for Station Blackout (SBO). Seabrook Station has chosen two paths for the recovery of off-site power in the event of a Station Blackout (SBO). Path 1 is colored green. Path 2 is colored red.

Documentation Sources

A number of CLB and design basis information sources were used in the scoping and screening process. The CLB for Seabrook Station is consistent with the definition provided in 10 CFR 54.3.

Plant documentation sources may contain system names that vary slightly. For example, the Waste Gas system (WG) may be referred to as the Radioactive Gaseous Waste system in the UFSAR. Similarly, Resin Sluicing system (RS) may be referred to as the Spent Resin Sluicing system in the UFSAR. System designators (e.g., WG, RS) remain consistent throughout the Seabrook Station documentation despite this minor variation in descriptors. The system names utilized in the License Renewal Application are consistent with the ones currently used in the plant and consistent with the names listed in the Seabrook Station Engineering data base. However, for clarification purposes, a cross reference is provided if the UFSAR system name is different than the current plant system name. This would appear, for example, as "Spent Resin Sluicing system [Resin Sluicing system (RS)] or Radioactive Gaseous Waste system [Waste Gas system (WG)]".

The significant sources of information used in this evaluation are discussed below.

Updated Final Safety Analysis Report

The Updated Final Safety Analysis Report (UFSAR) provides the information required by Revision 3 to the "*Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants*," Regulatory Guide 1.70, dated November, 1978. The Updated FSAR is divided into 17 chapters, using substantially the same format as NUREG-75/094. In 2002, the UFSAR was converted to a computer based living document, periodically updated throughout the reporting cycle. The Seabrook Station UFSAR has been updated regularly in accordance with requirements of 10 CFR 50.71(e).

Harsh Environment Equipment List

The Harsh Environment Equipment List identifies all Class 1E equipment, and other equipment important to safety, located in a potentially harsh environment and associates equipment within the scope of 10 CFR 50.49 to its applicable environmental qualification (EQ) file. This information is maintained in the Equipment Database (EDB) which includes an EQ data field.

Maintenance Rule Database

The Maintenance Rule database documents the results of the Maintenance Rule scoping for Seabrook Station systems and structures. The Maintenance Rule Database provides an additional source of information that aids in developing system and structure functions.

Design Basis Documents

System design basis documents (DBDs) are available for selected systems at Seabrook Station. These documents contain the basis for design at the system level and at the component level. They also include applicable licensing documents, codes and standards, along with calculation summaries and references. DBDs are intended to complement other upper tier documents such as the UFSAR and Technical Specification Bases.

Piping & Instrumentation Diagrams (P&IDs)

P&IDs are diagrams that have been created for piping system and ventilation systems. P&IDs provide valve, damper, piping, ductwork, instrumentation, and other component information. Instrument valves and fittings downstream of instrument root valves are not typically shown on P&IDs and are considered beyond the level of detail for these drawings. Safety Classification boundaries are indicated on the P&IDs.

Electrical Schematics

Electrical schematics were used to identify electrical systems and their safety functions.

Station Blackout Evaluation of NUMARC, Initiative No. 5

The analysis is an assessment of the ability to cope with a station blackout at Seabrook Station. This assessment is in compliance with NUMARC 87-00, "*Guidelines and Technical Basis for NURMAC Initiatives Addressing Station Blackout at Light Water Reactors*," dated November 1987, and Regulatory Guide 1.155, "*Station Blackout*".

Component Database

Seabrook Station maintains an Equipment Database (EDB) that contains component level design information. Data from the EDB was utilized to populate the Seabrook License Renewal (LR) database which served as an information repository for evaluations performed in support of License Renewal. The EDB contains plant components at the level of detail for which discrete maintenance or modification activities are performed. The database provides a comprehensive listing of plant components including component type, unique component identification number, safety and seismic classification, and other design data.

License Renewal Technical Reports

License Renewal Technical Reports (LRTR) were developed to assist in the identification of systems and structures that are in the scope of License Renewal. License Renewal Technical Reports were also issued to document the basis of approach taken on selected specialty topics that are addressed in the License Renewal Application (LRA).

2.1.2.1 10 CFR 54.4(a)(1) – Safety Related SSCs

Systems, structures and components that perform safety functions as defined in 10 CFR 54.4(a)(1) are within the scope of license renewal. Safety-related SSCs are uniquely identified at Seabrook Station. The definition of Safety Related is consistent with the definition in 10 CFR 54.4, as follows:

SSCs and related activities relied upon to remain functional during and following design basis events to ensure:

- The integrity of the reactor coolant boundary,
- The capability to shut down the reactor and maintain it in a safe shutdown condition,
- The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to §50.34(a)(1), §50.67, or §100.11 of 10 CFR 50, as applicable. Seabrook Station has implemented Alternate Source Term (AST) with NRC approval. Therefore, §50.67 guidelines are applicable to Seabrook Station. (AST was not adopted for the EQ, however, the existing conditions are bounding.)

Components are classified as Safety Class 1, Safety Class 2, Safety Class 3, and non-nuclear safety (NNS) in accordance with their importance to nuclear safety. This importance, as established by the assigned safety class, is applied in the design, materials, manufacture or fabrication, assembly, erection, construction, and operation. A single system may have components in more than one safety class. The definitions of safety classes listed apply to fluid pressure boundary components and the reactor containment. Supports that have a nuclear safety function are of the same safety class as the components that they support. All Class 1E safety-related electrical, instrumentation and controls systems are Safety Class 3.

The Equipment Database (EDB) was initially used to identify the safety classification of systems, structures and components for license renewal per 10 CFR 54.4(a)(1).

Seabrook Station P&IDs, Electrical One Line diagrams, Civil/Architectural drawings and the UFSAR were used to identify components required to support in-scope system-level and structure-level functions. As described in UFSAR section 3.2.2.2, safety class designation boundaries of safety-related systems are shown on the P&IDs and described in the respective sections of the UFSAR. Fluid system component safety class designations are listed in UFSAR Table 3.2-2. The Heating, Ventilation and Air Conditioning (HVAC) system component safety class designations are listed in UFSAR Table 3.2-4.

Seabrook Station structures, systems and components important to safety, as well as their foundations and supports, have been designed to withstand the effects of an Operating Basis Earthquake (OBE) and a Safe Shutdown Earthquake (SSE), and are thus designated as seismic Category I.

The structures, systems and components classified as seismic Category I are listed in UFSAR Table 3.2-1 and Table 3.2-2.

2.1.2.2 10 CFR 54.4(a)(2) – Non-Safety Related Affecting Safety-Related SSCs

10 CFR 54.4(a)(2) requires that all non-safety related systems, structures and components whose failure could prevent satisfactory accomplishment of any of the functions identified in §54.4(a)(1) be included within the scope of license renewal. These SSCs are classified non-nuclear safety (NNS) in the Seabrook Station UFSAR and is used interchangeably with the Non-safety related term.

The process used at Seabrook Station for identification of Non-Safety Affecting Safety (NSAS) related SSCs is consistent with the NEI 95-10 “Industry Guideline for Implementing the Requirements of 10CFR54 - The License Renewal Rule”, Rev. 6, June 2005.

SSCs required by §54.4(a)(2) for Seabrook Station are included in one of the following four categories:

- Current Licensing Basis (CLB) Topics. The Seabrook Station CLB includes a number of topics that identify non-safety related SSCs credited for preventive or mitigative functions in support of safe shutdown for special events (e.g., external floods) or whose failure could prevent satisfactory accomplishment of a safety related function (e.g., seismic interactions). The CLB Topics are discussed in sub-section 2.1.2.2.1.

- Non-safety related SSCs directly connected to safety related SSCs are discussed in sub-section 2.1.2.2.2.

- Non-safety related SSCs that are not directly connected to safety related SSCs but whose failure could prevent the satisfactory accomplishment of a safety related function due to spatial proximity. Non-Safety Related SSCs in spatial proximity of Safety Related SSCs are discussed in sub-section 2.1.2.2.3.

- A non-safety related SSC could provide functional support for a safety related intended function. The non-safety related SSC is required to function so that a safety related SSC performs its intended function (e.g., A non-safety related system provides cooling to a safety related pump). Non-Safety Related SSCs providing functional support for safety related SSCs are discussed in sub-section 2.1.2.2.4.

SSCs required by §54.4(a)(2) were identified by review of the Seabrook Station UFSAR and other CLB documentation. Plant drawings, DBDs, piping analyses, and the plant equipment database were also used. Plant walk downs were performed, as necessary, to confirm the spatial interaction boundaries.

2.1.2.2.1 Current Licensing Basis (CLB) Topics

The Seabrook Station CLB includes a number of topics that identify non-safety related SSCs credited for preventive or mitigative functions in support of safe shutdown for special events. Those topics are:

High Energy Line Break (HELB)

At Seabrook Station, the high energy piping systems were identified using the criteria if the service temperature is greater than 200°F or the design pressure is greater than 275 psig. A HELB could affect EQ Equipment in the area of the break by increasing the local temperature and humidity.

High energy line breaks inside and outside of the buildings are described in UFSAR section 3. The locations of postulated pipe ruptures were chosen for their potential adverse environmental impact of pressure, temperature and/or humidity on Safety Related Class 1E electrical equipment.

All high-energy lines identified in UFSAR section 3, Appendix 3I are included as in-scope for license renewal. High energy lines of one-inch diameter or smaller pipe size were excluded from the HELB analysis but still remain as a potential source of spray and/or leakage. All of the HELB Analysis pipe segments are located in buildings with Safety Related equipment and are therefore in the scope of License Renewal.

Protection from a high energy line break inside of buildings is provided primarily by separation and redundancy. High energy lines are routed to provide maximum protection by using plant structural elements, such as walls, columns, doors, and pipe whip restraints to prevent uncontrolled whipping of the high energy piping. Outside of buildings, protection from a high energy line break (postulated breaks in, or whip loads) is provided by seismic Category I reinforced concrete walls. These components are in-scope for license renewal.

Internal and External Flooding Events

Flooding from various internal sources (e.g., pipe breaks) and external sources were evaluated during the design of the plant.

Protection against possible internal flooding from liquid carrying systems, due to pipe rupture or fire protection activities are discussed in the following UFSAR Sections:

- Section 3.6 Protection against Dynamic Effects Associated with the Postulated Rupture of Piping
- Section 9.3.3 Equipment and Floor Drainage System
- Section 9.5.1 Fire Protection System
- Section 10.4.5.3 Circulating Water System

Internal Flooding features are associated with the Equipment and Floor Drainage System, including sumps, sump pumps, tanks, drains, and piping to remove water from potential internal flooding events, and fire protection activities for areas containing safety-related equipment. These design features are in-scope for license renewal.

Protection against possible internal flooding is discussed in UFSAR Section 3.4 “Water Level (Flood) Design”. Internal flood protection components are reinforced concrete walls, and concrete and steel curbs. These components are in-scope for license renewal.

Protection against possible external flooding is discussed in UFSAR Sections 2.4.5.5 “Protective Structures”, and Section 2.5.5 “Stability of Slopes”. External flood protection components are stone revetment, sheet pile retaining wall, and vertical seawall. These components are in-scope for license renewal.

Internal and External Missile Hazards

Missiles that could be generated from internal sources or external sources such as rotating equipment and tornados were considered in the design of the plant. Both preventive (e.g., over speed controls, seismic restraints) and mitigative (e.g., missile barriers) features were installed to ensure safe shutdown as required by the CLB for postulated missile hazards. These design features are in-scope for license renewal .

Missiles that could be generated from internal or external sources as described in UFSAR Section 3.5 for various building and structures are summarized in UFSAR Table 3.5-1. The missile protection feature (missile barriers) are typically included as part of the building structure (reinforced concrete wall, floor or ceiling). All structures and their missile shields and barriers listed on UFSAR table 3.5-12 are designed to resist internal and external missiles in accordance with the CLB, and are in-scope for license renewal.

Overhead Handling Systems

Overhead handling systems, including those associated with heavy loads as described in NUREG-0612 are considered to meet the criteria of 10 CFR 54.4(a)(2) and are in-scope for license renewal. Additionally, the refueling platform and fuel handling machine are considered to meet the criteria of 10 CFR 54.4(a)(2) and are in-scope for license renewal .

Coatings in Containment

Coatings in containment that are credited to remain in place during design bases events have been qualified for forty years. These coatings are considered a Time Limited Aging Analysis (TLAA) and addressed in section 4.7.7 for the period of extended operation. No credit is taken for protective coatings inside containment to prevent aging effects.

2.1.2.2.2 Non-Safety Related SSCs Directly Connected to Safety Related SSCs

For NNS SSCs directly connected to safety related SSCs, the in-scope boundary for license renewal extends into the NNS portion of the piping and supports up to and including the first seismic anchor or an equivalent anchor beyond the safety/non-safety interface. An equivalent seismic anchor is a combination of pipe restraints as described in UFSAR Section 3.7 (B) and Figure 3.7 (B) – 37.

An alternative used to specifically identify a seismic anchor or an equivalent anchor is to:

- Include the NNS piping run to the next large piece of plant equipment (e.g., pump, heat exchanger, tank, etc). The large piece of equipment must also be included in-scope and is subject to aging management for the intended function of being an anchor point for the piping run.
- Include the NNS piping run to a flexible connection – a flexible connection is considered a pipe stress analysis model end point when the flexible connection effectively decouples the piping system (i.e. does not support loads or transfer loads across it to connecting piping).
- For NNS piping runs such as vent or drain piping that end at open floor drains, include the entire piping in the scope of LR.
- For NNS piping runs that are connected to Safety Related (SR) piping at both ends, include the entire run of NNS piping between the SR piping.
- Include the buried portion of the piping in the scope of LR up to the point where the buried pipe exits the ground.

NNS structures attached to or next to Scoping Criteria 1 structures are in-scope for license renewal if their failure could prevent a Scoping Criteria 1 SSC from performing its intended function.

2.1.2.2.3 Non-Safety Related SSCs In Spatial Proximity Of Safety Related SSCs

For non-safety related NNS SSCs that are *not* directly connected to safety related SSCs, or are connected downstream of the first equivalent anchor, the non-safety SSCs may be in-scope if their failure could prevent the performance of the system safety function for which the safety related SSC is required.

Two approaches were used to determine if a non-safety related SSC in proximity to a safety related SSC is in scope for license renewal: the mitigative and preventive approach. Where it could be demonstrated that safety related SSCs are separated from non-safety related SSCs by physical barriers, the mitigative option was used (e.g., Tank Farm rooms TF101 and TF102). The preventive option was used in evaluating the vast majority of structures or systems at Seabrook for potential adverse structural or spatial interactions with Scoping Criterion 1 SSCs.

If a safety related component was determined to exist within that building, then all the NNS components within that building were included in the scope of LR. In other words, if a building contained a safety related component, then the entire building, not just the room, was included in the scope for NSAS.

There is one exception to the application of above methodology. NEI-95-10 section 3.1.1 recognizes that … "*a system, structure or component may not meet the requirements of §54.4(a) (1) although it is designated as safety related for plant specific reasons. However, the systems, structures and components would still need to be evaluated for inclusion into the scope of the Rule using the criteria in §54.4(a) (2) and §54.4(a) (3).*"

The Turbine Building contains components associated with the reactor protection and engineered safety features actuation system which have been classified as safety related in the plant equipment database. There are no other safety related SSCs in the Turbine Building. These components do not perform a safety function, as defined in 10 CFR 54.4(a) (1), and are not credited in the Seabrook Station accident analysis. The CLB does not credit operation of these components during or after a seismic event and thus seismic design or qualification is not required. Therefore, there are no components in the Turbine Building that are considered to be in scope for license renewal as defined in 10 CFR 54.4(a) (2).

The Turbine Building is a non-seismic Category I structure (UFSAR 1.2.2.9). The entire Turbine Building is designed against failure due to Tornado Wind and SSE Loads that could affect any seismic Category I structures in the proximity and therefore considered to be in-scope for license renewal as defined in 10 CFR 54.4(a) (2) (UFSAR Tables 3.3-4 and 3.7(B)-22).

Air/Gas Systems (For NNS SSCs that are not directly connected to SR SSCs)

Leakage of NNS air-gas systems (non-liquid) are not a hazard to other plant equipment because they do not contain sufficient energy to cause pipe whip or jet impingement. A site specific review was made of operating experience in regards to air/gas systems which verified that air/gas systems have not negatively affected other plant equipment. All supports in buildings with 10 CFR 54.4(a)(1) components are in-scope for license renewal. Per NEI 95-10, Appendix F, the air/gas NNS piping and piping components for NNS SSCs that are not directly connected to safety-related SSCs are not in-scope.

NNS Conduits, Trays, Junction Boxes, and Lighting Fixtures

NNS conduits, cable trays, junction boxes, lighting fixtures may contain or be routed near Scoping Criterion 1 cables or other components. To determine which of these commodities to consider in-scope for license renewal, a conservative simplified approach is used. All NNS conduits, trays, junction boxes and lighting fixtures and their supports located within structures housing safety related equipment are in-scope for license renewal.

NNS HVAC Ducts and Supports

At Seabrook Station, the non-nuclear safety (NNS) HVAC ducting was evaluated similar to air/gas piping systems utilizing the guidance provided in NEI 95-10 Appendix F. All HVAC duct supports located within structures housing Scoping Criterion 1 components are in-scope for license renewal similar to Air/Gas Systems.

2.1.2.2.4 Non-Safety SSCs Providing Functional Support for Safety Related SSCs

The review of the CLB identified a diesel driven pump as a component that supports a safety related intended function. The portable Cooling Tower makeup pump is maintained on the site. It is capable of providing makeup water to the Service Water System (section 2.3.3.37) Cooling Tower basin from the nearby Browns River or Hampton Harbor with several locations accessible by road. This pump is stored in a Seismic Category 1 building, and is used to ensure a 30 day supply of water in the cooling tower basin in the event of design bases event and subsequent seismic event, the Safe Shutdown Earthquake. This diesel driven pump (1-SW-P-329) has been included in the scope of license renewal.

2.1.2.3 10 CFR 54.4(a)(3) – Regulated Events

The third scoping category in 10 CFR 54.4 involves SSCs relied upon by licensees to address five regulated events. Specifically, §54.4(a)(3) defines SSCs as in-scope for license renewal, if relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with one or more of the regulated events:

- Fire Protection (10 CFR 50.48)
- Environmental Qualification (10 CFR 50.49)
- Anticipated Transient Without Scram (10 CFR 50.62)
- Station Blackout (10 CFR 50.63)

- Pressurized Thermal Shock (10 CFR 50.61)

Any SSC that is required to function in order to meet compliance requirements of one or more of these regulations was identified as required by §54.4(a)(3). All SSCs required by §54.4(a)(3) are in-scope for license renewal.

Conduits, trays, junction boxes and lighting fixtures and their supports required for regulated events that are located in structures not housing Scoping Criterion 1 equipment are in-scope for license renewal.

A review of the CLB and plant documentation was performed to determine SSCs that support these regulated events and, therefore, in-scope for license renewal. The results of this review were documented in technical reports and incorporated into the license renewal database. The following discussion describes the methodology used in this review.

Fire Protection Scoping

All systems, structures and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) were included in the scope of License Renewal in accordance with 10 CFR 54.4(a)(3) requirements.

The scope of systems and structures required for compliance with 10 CFR 50.48 are described in UFSAR Appendix A and Appendix R. They include:

- Systems and structures required to demonstrate safe shutdown capabilities.

- Systems and structures required for fire detection and suppression needed to support safe shutdown.

- Systems and structures required to meet commitments made to Appendix A of Branch Technical Position APCSB 9.5-1 with respect to the protection of systems important to safety and prevention of radioactive releases to the environment.

The License Renewal fire protection technical report documents the results of a detailed review of Seabrook's fire protection program documents that demonstrate compliance with the requirements of 10 CFR 50.48. This document provides a list of systems and structures credited in the plant's fire protection and safe shutdown evaluations. The identified systems and structures are in the scope of License Renewal under 10 CFR 54.4(a)(3) scoping criteria.

Safe shutdown in the event of a fire is achieved at Seabrook Station utilizing fire protection features (detection, suppression and containment) and by having a minimum of one train required for safe shutdown free of fire damage.

The Seabrook Station design basis for 10 CFR 50.48 fire assumes that a fire occurs in a given Fire Area (FA) rendering all safe shutdown systems (cable and components) in the Fire Area inoperable. 10 CFR 50.48 also assumes that only fire induced failures occur (no random single failure) and that no severe natural phenomena (e.g. design bases earthquake) or accident occur concurrent with the fire, with the result that safe shutdown can be achieved.

Environmental Qualification Scoping

The CLB for Seabrook Station's EQ Program is Title 10, Part 50, Section 49 of the Code of Federal Regulations (10 CFR 50.49). This is achieved via conformance to the requirements of NUREG-0588, "*Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment*" Category I criteria. Category I criteria incorporates and supplements IEEE 323-1974, "*IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations*".

Pursuant to the requirements of 10 CFR 50.49, Seabrook Station established a program for qualifying the electrical equipment defined in §50.49(b).

The EQ portion of the license renewal scoping was performed utilizing the Harsh Environment Equipment list. Systems and structures containing equipment within the scope of the EQ Program were identified. The buildings serve to provide shelter, support and protection of EQ equipment.

Components in the EQ program are evaluated in the EQ TLAA, Section 4.4.

Anticipated Transients Without Scram Scoping

10 CFR 54.4(a)(3) requires that all systems, components and structures relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transients Without Scram (ATWS) (10 CFR 50.62) be included in the scope of License Renewal.

For Seabrook Station, a Westinghouse PWR, the following requirements from 10 CFR 50.62 a (1) apply, "Each pressurized water reactor (PWR) must have equipment from sensor output to final actuation device, that is diverse from the reactor trip system, to automatically initiate the auxiliary (or emergency) feedwater system and initiate a turbine trip under conditions indicative of an ATWS. This equipment must be designed to perform its function in a reliable manner and be independent (from sensor output to the final actuation device) from the existing reactor trip system."

An ATWS Mitigation System (AMS) is installed at Seabrook Station which provides an alternative means for automatically tripping the turbine and actuating Emergency Feedwater (EFW) flow that is independent of the protection system actuations.

Seabrook Station SSCs used to mitigate an ATWS event have been included in the scope of License Renewal.

Station Blackout Scoping

10 CFR 54.4(a)(3) requires that all systems, structures and components relied upon in safety analyses or plant evaluations to perform a function that is credited in demonstrating compliance with the Commission's regulations for Station Blackout (10 CFR 50.63) be included in the scope of License Renewal.

Station Blackout (SBO) is an event resulting from the complete loss of alternating current (AC) electric power to the essential and nonessential switchgear buses in a nuclear power plant (i.e., loss of offsite power concurrent with a generator trip and loss both diesel backed safety related electric buses). SBO does not include loss of AC power to buses powered by battery backed buses. The SBO event does not postulate concurrent single failure or other design bases event in addition to the SBO.

Seabrook Station complies with the requirements of 10 CFR 50.63 as a coping plant. This means that safe shutdown can be maintained using battery backed electrical buses for the four hour coping period. Offsite power and or onsite power will be restored at or before the end of the four hour coping period.

The SBO Offsite Recovery Path License Renewal Drawing, Figure 2.5-1, was created to depict the in-scope portion of the off-site power system for Station Blackout (SBO). Seabrook Station has chosen two paths for the recovery of off-site power in the event of a Station Blackout (SBO). Path 1 is colored green. Path 2 is colored red.

Pressurized Thermal Shock

Criterion 10 CFR 54.4(a)(3) requires that all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for PTS be included in the scope of License Renewal

Pressurized Thermal Shock (PTS) is a condition that could challenge the integrity of the reactor pressure vessel (RPV). Pressurized Thermal Shock (PTS) may occur during a severe transient such as a Loss of Coolant Accident (LOCA) or a steam line break. Such transients can challenge the RPV integrity under the following conditions:

- Severe overcooling of the inner surface of the RPV followed by high repressurization
- Radiation embrittlement of RPV materials causing a shift in the nil-ductility reference temperature and a decrease in the fracture toughness
- Presence of a flaw/defect of a critical size in the vessel wall

The steel reactor vessel beltline shell, including plates, forgings, and welds, were determined to meet the scoping criteria of 10 CFR 54.4 with respect to pressurized thermal shock.

2.1.3 SCREENING METHODOLOGY

General Screening Process

Structures and components (or component commodity groups) that perform an intended function without moving parts or without a change in configuration or properties are defined as passive for License Renewal. Passive structures and components that are not subject to replacement based on a qualified life or specified time period are defined as long-lived for License Renewal. The screening process was used to identify the passive, long-lived structures and components in the scope of License Renewal and subject to aging management review. The Seabrook Station screening process determines the structures and components subject to aging management review by:

- Listing the in-scope structures and components by component type,
- Screening component types by using the passive and long lived criteria, and
- Identifying the intended functions performed by these structures and components by component type.

NUREG-1800, "*Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*" and NEI 95-10, Appendix B were used as the basis for the identification of passive structures and components. Most passive structures and components are long-lived. In the few cases where a passive component is determined not to be long-lived, such determination is documented in the screening evaluation (e.g., solenoid valves that are periodically replaced).

Intended functions used to define passive structures and components are identified in LRA Table 2.1-1. Structures and components may have multiple intended functions (e.g., heat exchanger with heat transfer and pressure boundary intended functions). Seabrook Station has considered multiple intended functions where applicable, consistent with the staff guidance provided in Tables 2.1-4(a) and (b) of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants". If a component did not have at least one component-level intended function, the component was not subject to an aging management review.

Detailed scoping and screening reports have been prepared which identify all structures and components subject to an aging management review. These reports have been prepared for all systems, structures, or commodity groups (except electrical commodities) in-scope for License Renewal.

Passive, long lived electrical commodities subject to an aging management review were identified using guidance in NEI 95-10.

The Seabrook Station structures and components subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.21(a)(1). The process implemented to meet these requirements is described as follows:

Mechanical Screening

Mechanical components have been screened with the system in which they were scoped. Plant components such as heat exchangers and coolers that have License Renewal intended functions that are unique have been identified at the subcomponent level to ensure all the intended functions and material / environment combinations are considered in the evaluation (e.g., channel head, shell, tubes, and tube sheet).

Civil/Structural Screening

The screening process was applied to in-scope buildings and civil structures to identify the structural elements to be evaluated in the aging management reviews. Screening evaluation boundaries were established based on the scoping boundary results. In some cases, individual structures were grouped together for screening due to similarity in construction or other common features to simplify the screening process and presentation of the aging management review results.

The Seabrook Station scoping and screening process used a “spaces” approach in establishing the evaluation boundaries. With few exceptions, the scoping and screening boundary for a building or structure is an entire building or buildings, including the doors, supports, base slabs, foundations, walls, beams, slabs, roofs, penetration seals and structural steel. The various types of structural elements, and materials that make up the buildings were identified and listed. The listing of structural elements is facilitated by grouping them into component groups. Structural components/commodities often do not have unique identifiers such as those given to mechanical components. Therefore, identifying structural components as commodities based on materials of construction, their environment and functional applications provided an identification system for aging management reviews.

A list of structural commodities (example; carbon steel with indoor air includes, but is not limited to: carbon steel decking, embedments, fasteners, grating, other miscellaneous steel such as fire walls made from carbon steel siding, doors, plates, platforms, rails for hoists, and shapes) was developed for each civil/structural evaluation boundary. Most structural elements have no moving parts and do not change configuration or properties. Since structures are inherently passive, and long-lived, the screening of structural commodities was based primarily on whether or not they performed an intended function under 10 CFR 54.4(a). Structural commodities that perform an intended function without moving parts and without a change in configuration or properties, and that are not subject to replacement based on a qualified life or specified time period, are subject to aging management review.

Electrical Screening

Screening of electrical and I&C components used a bounding approach as described in NEI 95-10. All Electrical and I&C systems were considered in-scope. Electrical and I&C components were assigned to a commodity grouping. The commodity groups subject to an aging management review were identified by applying the criteria of 10 CFR 54.21(a)(1). This method provided the most efficient means for determining the electrical commodity groups subject to an aging management review since many of the electrical components are active.

The sequence of steps used by Seabrook Station for identification of electrical commodity groups that require an aging management review was as follows:

(1) The criteria of 10 CFR 54.21(a)(1)(i) was applied to identify commodity groups that perform their intended functions without moving parts or without a change in configuration or properties (referred to as “passive” components). These electrical commodity groups were identified utilizing the guidance of NEI 95-10.

(2) Portions of electrical commodity groups that perform no License Renewal intended functions do not require aging management review and were not considered further (e.g., ground conductors, switchyard components outside of SBO boundary).

(3) The screening criterion found in 10 CFR 54.21(a)(1)(ii) excludes those commodity groups that are subject to replacement based on a qualified life or specific time period from the requirements of an aging management review. The 10 CFR 54.21(a)(1)(ii) screening criterion was applied to those commodity groups that were not previously eliminated by the application of the 10 CFR 54.21(a)(1)(i) screening criterion or previously eliminated because they do not perform a License Renewal intended function. Electrical components included in the plant environmental qualification (EQ) program are replaced on a specified interval based on a qualified life. These components are managed as time-limited aging analyses (TLAAs) and addressed in Section 4.4. Components in the EQ program do not meet the "long-lived" criteria of 10 CFR 54.21(a)(1)(ii) and are "short-lived" per the regulatory definition and are therefore not subject to an aging management review.

(4) A review was performed on the remaining commodity groups, considering industry and Seabrook Station operating experience.

(5) Components which support or interface with electrical components (e.g., cable trays, conduits, instrument racks, panels and enclosures) are assessed as civil/structural components in Section 2.4.

(6) The electrical commodities that require an aging management review are passive electrical commodities. The passive commodity groups that are not subject to replacement based on a qualified life or specified time period are subject to an aging management review. For Seabrook Station, the electrical commodity groups that require an aging management review are identified in Section 2.5.1.

(7) Components which function as an electrical commodity and a mechanical pressure boundary (e.g., solenoid valves, motor operated valves, heaters, elements, Resistance Temperature Detectors (RTD's), sensors, thermocouples or transducers) are evaluated in separate sections. The mechanical function is evaluated in Section 2.3. The electrical function is evaluated in Section 2.5.

Insulation

At Seabrook Station, thermal insulation was treated as a passive, long lived component during the scoping and screening process. There is no aging effect for thermal insulation in an "air-indoor uncontrolled" environment, however, aluminum insulation jacketing in "air with borated water leakage environment" would have an aging effect of loss of material due to boric acid corrosion. This aging effect will be age managed by the Boric Acid Corrosion Program. The intended function for "Insulation" per Table 2.1-1 is "Provide temperature control."

For license renewal purposes, thermal insulation jacketing is being addressed as a commodity group in the civil / structural section of the license renewal application. Therefore, insulation is not included as a separate component type in each mechanical in scope system. The thermal insulation jacketing is shown in Table 3.5.2-6.

Consumables

The evaluation process used for consumables is consistent with the guidance provided in NUREG-1800 Table 2.1-3. Consumables have been divided into the following four 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.

- Group (a) subcomponents (packing, gaskets, seals, and O-rings): Based on American National Standards Institute (ANSI) B31.1 and the American Society of Mechanical Engineers (ASME) B&PV Code Section III, the subcomponents of pressure retaining components as shown above are not pressure-retaining parts. Therefore, these subcomponents are not relied on to form a pressure retaining function and are not subject to an AMR.

- Group (b) structural sealants: Structural sealants are required to have an aging management review. A summary of the AMR results is presented in Section 2.4.

- Group (c) subcomponents (oil, grease, and component filters): These components are short lived and are periodically replaced. Plant procedures are used in the replacement of oil, grease, and filters in components that are in scope for License Renewal.

- Group (d) consumables (system filters, fire extinguishers, fire hoses, and air packs): System Ventilation filters are replaced in accordance with plant procedures based on vendor manufacturers' requirements and system testing. Fire extinguishers, self-contained breathing air packs and fire hoses are within the scope of License Renewal, but are not subject to aging management because they are replaced based on condition. These components are periodically inspected in accordance with National Fire Protection Association (NFPA) standards (NFPA 10 Code for Portable Extinguishers, NFPA 1962 Code for Inspection, care, use of Fire Hose, Couplings, and Nozzles and NFPA 1981 Respiratory Protective Equipment for Fire Fighters). These standards require replacement of equipment based on their condition or performance during testing and inspection. The periodic inspections are implemented by controlled Seabrook procedures. These components are subject to replacement based on NFPA standards implemented by controlled procedures, and are therefore, not long-lived and not subject to an aging management review.

2.1.4 INTERIM STAFF GUIDANCE (ISG)

The NRC staff has developed guidance documents to capture new insights or address emerging issues as they evolve from application reviews. This guidance is contained in “Interim Staff Guidance” (ISG) documents. The purpose of an ISG is to provide guidance on emerging issues during the development of the License Renewal applications until such time these issues can be incorporated into the license renewal guidance documents.

<u>LR-ISG-19B</u> *Cracking of Nickel-Alloy Components in the Reactor Coolant Pressure Boundary*

Issuance of this interim staff guidance has been “deferred”. The NRC staff has prepared a draft aging management program, XI.M11B, "Cracking of Nickel-Alloy Components in the Reactor Coolant Pressure Boundary". This program will be included in the update of NUREG-1801, “Generic Aging Lessons Learned (GALL) Report” and will not become an LR-ISG.

Seabrook Station has addressed nickel-alloy aging mechanisms in Section B.2.1.5, "Nickel-Alloy Penetration Nozzles Welded to the Upper RV Closure Heads of PWRs" and Section B.2.2.3 "Nickel-Alloy Nozzles and Penetrations" and is consistent with NUREG-1801 programs XI.M11A and XI.M11 respectively.

<u>LR-ISG-23</u> *Replacement Parts Necessary to Meet 10 CFR 50.48 (Fire Protection)*

This interim staff guidance has been withdrawn. The NRC staff determined that additional guidance on this topic is not necessary, as documented by letter dated December 20, 2006.

<u>LR-ISG-2006-01</u> *Plant-Specific Aging Management Program for Inaccessible Areas of Boiling Water Reactor Mark I Steel Containment Drywell Shell*

The interim staff guidance was issued as “final” and is not applicable to Seabrook Station. This ISG is only applicable to boiling water reactors with Mark I steel containments drywell shells and is not applicable to pressurized water reactor designs.

LR-ISG-2006-02 *Staff Guidance on Acceptance Review for Environmental Reports for License Renewal* Applications

A notice of “withdrawal” of the Proposed LR-ISG-2006-02 was published in the *Federal Registe*r on July 16, 2009. Seabrook Station has prepared the License Renewal Environmental Report in accordance with NUREG-1437 *Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants, May 1996.*

LR-ISG-2006-03 *Staff Guidance For Preparing Severe Accident Mitigation Alternatives Analyses*

This interim staff guidance has been issued as “final” and is applicable to Seabrook Station. The Seabrook Station severe accident mitigation alternatives analysis is provided in Appendix E to this application. This analysis is consistent with the guidance provided in NEI 05-01, *Severe Accident Mitigation Alternatives.*

LR-ISG-2007-01 *License Renewal Interim Staff Guidance Process, Revision 1*

A notice of availability of the “final” LR-ISG-2007-01 was published in the *Federal Register* on August 17, 2009.

This LR-ISG issues a revised process for guiding the development and implementation of LR-ISGs. The revised process supersedes the previous process entitled, “Process for Interim Staff Guidance,” which the NRC staff issued on December 12, 2003.

The LR-ISG does not affect development of the Seabrook Station License Renewal Application.

LR-ISG-2007-02 *Changes to Generic Aging Lessons Learned (GALL) Report Aging Management Program (AMP) XI.E6, “Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements”*

This interim staff guidance has been issued as “final” and is applicable to Seabrook Station. Seabrook Station has addressed LR-ISG-2007-02 in the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program, which is described in Section B.2.1.32.

LR-ISG-2008-01 *Staff Guidance Regarding the Station Blackout Rule (10 CFR 50.63) Associated with License Renewal Applications*

A notice of “withdrawal” of the Proposed LR-ISG-2008-01 was published in the Federal Register on July 13, 2009.

LR-ISG-2009-01 *Staff Guidance Regarding Aging Management of Spent Fuel Pool Neutron-Absorbing Materials Other Than Boraflex*

The interim staff guidance has been issued. The guidance states that "an applicant may reference this proposed program in a license renewal application to demonstrate that the programs at the applicant’s facility are acceptable until this guidance is implemented into the next update of the Generic Aging Lessons Learned (GALL) Report".

Because NUREG-1801, Section XI does not contain an Aging Management Program for monitoring the aging effects on Boral, the guidance provided in Draft LR-ISG-2009-01 was used to evaluate the Seabrook Station Boral Monitoring Program. Seabrook Station has reviewed the final LR-ISG-2009-01, “*Aging Management of Spent Fuel Pool Neutron-Absorbing Materials Other than Boraflex*”, dated May 4, 2010 and determined that the Seabrook Station Boral Monitoring Program Meets the requirements of the final guidance.

2.1.5 GENERIC SAFETY ISSUES

In accordance with the guidance in NEI 95-10 and Appendix A.3 of NUREG-1800, “Standard Review Plan for 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 10 CFR 54.29. GSIs involving issues related to License Renewal aging management reviews or TLAAs should be addressed in the License Renewal Application. Based on guidance provided in NEI 95-10, “*Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule, Revision 6*”, NUREG-0933 Supplement 29 dated November 2005, and previous License Renewal applicants, the following GSIs are addressed for Seabrook Station License Renewal:

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 reactor coolant pressure boundary and are the subject of an aging management review and TLAA evaluation as documented in Section 3.0 and 4.0. The issue of age-related degradation of steam generator tubes is being addressed within the Seabrook Station CLB and will continue to be addressed during the period of extended operation by the Steam Generator Tube Integrity program discussed in Section B.2.1.10.

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, which may block the sump strainers. In 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, Seabrook Station committed to debris screen modifications in accordance with the Generic Letter requirements. Installation of the debris screen modifications has been completed and incorporated into the IPA . Seabrook Station does not credit coatings inside containment to manage aging of SSCs. However, coatings in containment that are credited to remain in place during design bases events have been qualified for forty years. Therefore, these coatings are considered a Time Limited Aging Analysis (TLAA) and addressed in Section 4.7.7 for the period of extended operation.

2.1.6 CONCLUSION

The scoping and screening methodology described above was used for the Seabrook Station IPA to identify the systems, structures, and components that are within the scope of License Renewal and require an aging management review. The methodology is consistent with and satisfies the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1).

TABLE 2.1-1

PASSIVE STRUCTURE/COMPONENT INTENDED FUNCTIONS

Intended Function	Description
Absorb neutrons	Absorb neutrons
Control Building Habitability	Minimize in-leakage by maintaining/support positive pressure in the Control Building isolation mode
Direct flow	Provide spray shield or curbs for directing flow
Electrical Continuity	Provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals
Expansion/separation	Provide for thermal expansion and/or seismic separation
Filter	Provide filtration
Fire barrier	Provide rated fire barrier to confine or retard a fire from spreading to and from adjacent areas of the plant
Flood barrier	Provide flood protection barrier (internal and external flooding event)
Heat transfer	Provide heat transfer
HELB Shielding	Provide shielding against high energy line breaks
Insulate (electrical)	Insulate and support an electrical conductor
Insulate	Provide temperature control
Leakage boundary (spatial)	Non-safety related component that maintains mechanical and structural integrity to prevent spatial interactions that could cause failure of safety related SSCs
Missile barrier	Provide missile barrier (internally or externally generated)
Pressure boundary	Provide pressure retaining boundary so that sufficient flow at adequate pressure is delivered, or provide fission product barrier for containment pressure boundary, or provide containment isolation for fission product retention
Shelter, protection	Provide shelter/protection to safety related components
Shielding	Provide shielding against radiation

Intended Function	**Description**
Spray	Convert fluid to spray
Structural integrity (attached)	Non-safety related component that maintains mechanical and structural integrity to provide structural support to attached safety related piping and components
Structural pressure barrier	Provide pressure boundary or essentially leak tight barrier to protect public health and safety in the event of any postulated design basis events
Structural support	Provide structural and/or functional support to safety related and/or non-safety related components
Support	Support/mitigate regulated events
Throttle	Provide flow restriction

FIGURE 2.1-1

SCOPING FLOWCHART

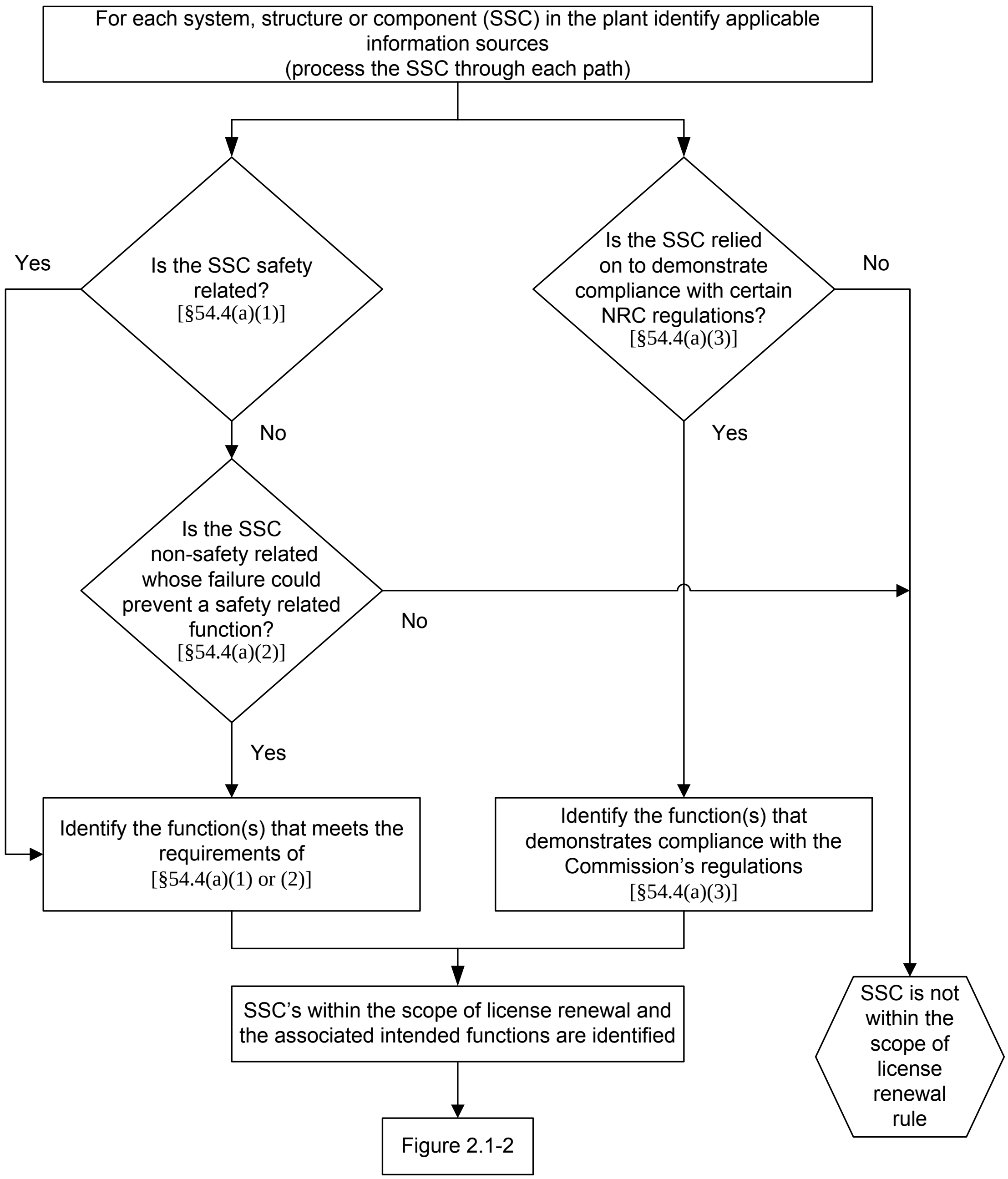
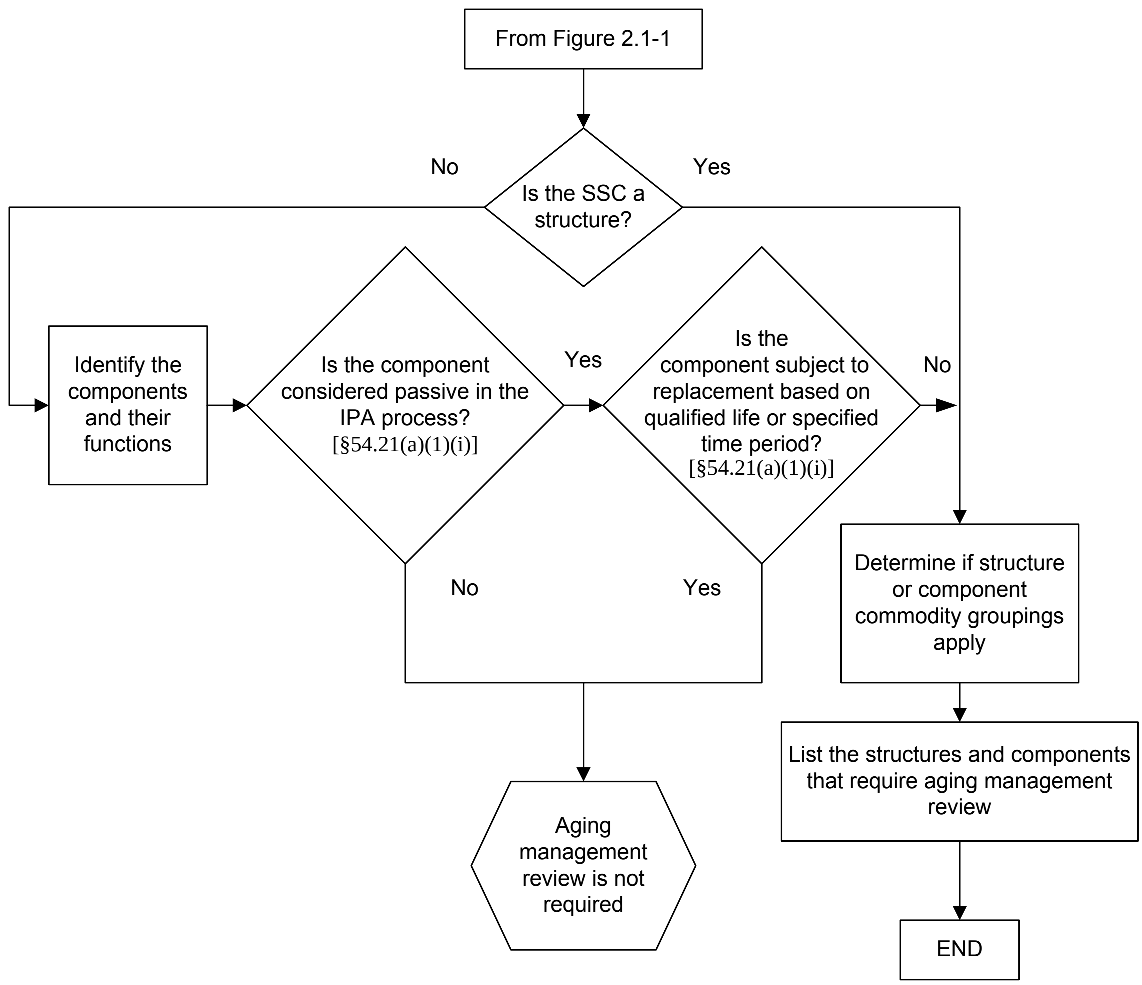


FIGURE 2.1-2

SCREENING FLOWCHART



2.2 PLANT LEVEL SCOPING RESULTS

Table 2.2-1 lists the Seabrook Station systems, structures and a commodity group that were evaluated using the methodology described in Section 2.1 and determined to be within the scope of license renewal. The system or structure identifier is included. For each in-scope system, structure group or commodity group, a reference is provided to the section containing the scoping and screening results.

Table 2.2-2 lists the Seabrook Station systems, structures and commodity groups that were evaluated using the methodology described in Section 2.1 and were determined to not be in the scope of license renewal. A reference to the applicable Seabrook Station Updated Final Safety Analysis Report (UFSAR) section(s), where available, is provided for each Mechanical and Electrical/Instrumentation and Controls (I&C) system determined to not be in scope. Structures listed in Table 2.2-2 are provided with clarifying notes as to why these structures are not in scope.

Table 2.2-1 Systems and Structures Within the Scope of License Renewal

System – Structure	System - Structure ID	Section 2 Scoping Results
Mechanical Systems		
Reactor Vessel, Internals, and Reactor Coolant System		
Reactor Coolant	RC	2.3.1.1
Reactor Vessel	RV	2.3.1.2
Reactor Vessel Internals	RVI	2.3.1.3
Steam Generator	SG	2.3.1.4
Engineered Safety Systems		
Combustible Gas Control	CGC	2.3.2.1
Containment Building Spray	CBS	2.3.2.2
Residual Heat Removal	RH	2.3.2.3
Safety Injection	SI	2.3.2.4
Auxiliary Systems		
Auxiliary Boiler	AB	2.3.3.1
Boron Recovery System	BRS	2.3.3.2
Chemical and Volume Control System	CS	2.3.3.3
Chlorination	CL	2.3.3.4
Containment Air Handling	CAH	2.3.3.5
Containment Air Purge	CAP	2.3.3.6
Containment Enclosure Air Handling	EAH	2.3.3.7
Containment Online Purge	COP	2.3.3.8
Control Building Air Handling	CBA	2.3.3.9
Demineralized Water	DM	2.3.3.10
Dewatering	DW	2.3.3.11
Diesel Generator	DG	2.3.3.12
Diesel Generator Air Handling	DAH	2.3.3.13

System – Structure	System - Structure ID	Section 2 Scoping Results
Mechanical Systems		
Emergency Feedwater Pumphouse Air Handling	EPA	2.3.3.14
Fire Protection	FP	2.3.3.15
Fuel Handling	FH	2.3.3.16
Fuel Oil	FO	2.3.3.17
Fuel Storage Building Air Handling	FAH	2.3.3.18
Hot Water Heating	HW	2.3.3.19
Instrument Air	IA	2.3.3.20
Leak Detection	LD	2.3.3.21
Mechanical Seal Supply System	MSS	2.3.3.22
Miscellaneous Equipment	MM	2.3.3.23
Nitrogen Gas	NG	2.3.3.24
Oil Collection for Reactor Coolant Pumps	OC	2.3.3.25
Plant Floor Drain	DF	2.3.3.26
Potable Water	PW	2.3.3.27
Primary Auxiliary Building Air Handling	PAH	2.3.3.28
Primary Component Cooling Water	CC	2.3.3.29
Radiation Monitoring	RM	2.3.3.30
Reactor Makeup Water	RMW	2.3.3.31
Release Recovery	RR	2.3.3.32
Resin Sluicing	RS	2.3.3.33
Roof Drains	DR	2.3.3.34
Sample System	SS	2.3.3.35
Screen Wash	SCW	2.3.3.36
Service Water	SW	2.3.3.37
Service Water Pumphouse Air Handling	SWA	2.3.3.38
Spent Fuel Pool Cooling	SF	2.3.3.39
Switchyard	SY	2.3.3.40, 2.5
Valve Stem Leak Off	VSL	2.3.3.41

System – Structure	System - Structure ID	Section 2 Scoping Results
Mechanical Systems		
Vent Gas	VG	2.3.3.42
Waste Gas	WG	2.3.3.43
Waste Processing Liquid	WL	2.3.3.44
Waste Processing Liquid Drains	WLD	2.3.3.45
Steam and Power Conversion Systems		
Auxiliary Steam	AS	2.3.4.1
Auxiliary Steam Condensate	ASC	2.3.4.2
Auxiliary Steam Heating	ASH	2.3.4.3
Circulating Water	CW	2.3.4.4
Condensate	CO	2.3.4.5.
Feedwater	FW	2.3.4.6
Main Steam	MS	2.3.4.7
Steam Generator Blowdown	SB	2.3.4.8
Structures and Component Supports		
Buildings Affecting Safety		2.4.1
Discharge Transition Structure	10	2.4.1
Fire Pumphouse, Tank Foundation and Donkey Boiler House	30, 31, 82 & 84	2.4.1
Intake Transition Structure	9	2.4.1
Nonessential Switchgear Building	13	2.4.1
Revetment	37, 38 & 39	2.4.1
Steam Generator Blowdown Recovery Building	46	2.4.1
Containment Structures		2.4.2
Containment Structure	1	2.4.2
Containment Enclosure Building	2	2.4.2
Containment Enclosure Ventilation Area	3	2.4.2
Fuel Handling & Overhead Cranes		2.4.3
Miscellaneous Yard Structures		2.4.4

System – Structure	System - Structure ID	Section 2 Scoping Results
Structures		
Condensate Storage Tank Enclosure	80	2.4.4
Control Room Makeup Air Intake Structures	27	2.4.4
Nonsafety Related Electrical Duct Banks/Manholes	n/a	2.4.4
Safety Related Electrical Duct Banks/Manholes	n/a	2.4.4
Service Water Access Vault	17	2.4.4
Station Blackout Structures	28 & 29	2.4.4
Primary Structures		2.4.5
Containment Equipment Hatch Missile Shield	83	2.4.5
Control and Diesel Generator Building	11 & 12	2.4.5
Emergency Feedwater Pump Building, including Electrical Cable Tunnels and Penetration Area	18	2.4.5
Fuel Storage Building	16	2.4.5
Main Steam and Feedwater Pipe Chases East & West	19 & 20	2.4.5
Personnel Hatch Area	22	2.4.5
Primary Auxiliary Building including Residual Heat Removal Vault	15	2.4.5
Tank Farm	23	2.4.5
Waste Processing Building	24	2.4.5
Supports	n/a	2.4.6
Turbine Building	4	2.4.7
Water Control Structures		2.4.8
Service Water Cooling Tower	25	2.4.8
Service Water Pumphouse	7	2.4.8
Circulating Water Pumphouse	6	2.4.8
Electrical and I&C Systems		
Electrical Distribution	ED	2.5

System – Structure	System - Structure ID	Section 2 Scoping Results
Electrical and I&C		
Electrical Distribution - Emergency	EDE	2.5
Grounding	GD	2.5
Heat Tracing	HT	2.5
Incore Instrumentation	IC	2.5
Lighting	LTG	2.5
Meteorological System	MET	2.5
Nuclear Instrumentation	NI	2.5
Public Address Communication	PAC	2.5
Radiation Monitoring	RM	2.5
Rod Control and Position	CP	2.5
Security & Fire Detection System	SFD	2.5
Seismic Monitoring	SM	2.5
STA Info & Alarm Comp	SC	2.5
Turbine Electro-Hydraulic System	EHC	2.5
Turbine Supervisory Instrumentation	TSI	2.5
Vibration Monitoring	VB	2.5

Table 2.2-2 Systems and Structures Not In the Scope of License Renewal

System - Structure	System - Structure ID	UFSAR Reference and Notes
Mechanical Systems		
Admin Bldg Air Handling	AAH	9.4.12
Acetylene	ACT	
Argon Methane	AM	
Argon	AN	
Condenser Air Evacuation	AR	10.4.2.1, 10.4.2.5
Boiling Water Guardhouse	BW	
Carbon Dioxide	CD	10.2.2.2
Chemical Laboratory Vacuum	CLV	
Chemical Analysis System	CAS	9.3.2, 10.3.5.1 & .3
Chemical Treatment & Secondary Chemistry	CT	
Chilled Water	CHW	
Chlorination Air Handling	CLA	
Condensate Polishing Air Handling	CPH	
Condensate Polishing System	CPS	10.4.6.1 & .2
Contaminated Waste	DCW	
CW Pumphouse Air Handling	CWA	
Decontamination Area Waste	DC	9.3.3.2.b.6
Decontamination Waste Vent	DCV	
Dry Fuel Storage	DFS	1.2.2.22
Electrical Tunnel Air Handling	ETA	
Equipment Handling	EH	
Extraction Steam	EX	10.2.2.3
Fire Pumphouse Air Handling	FPA	
Generator Stator Coolant	GSC	
Guardhouse Air Handling	GAH	
Heater Drains	HD	

System - Structure	System - Structure ID	UFSAR Reference and Notes
Mechanical Systems		
Helium	HE	
Hydraulic Fluid	HF	10.2.2.4
Hydrogen Gas	HG	10.2.2.2, 11.3.2
Hydrogen Gas to Generator	HGG	10.2.2.2
Isobutane - Helium	IH	
Lubricating Oil	LO	
Mapp Gas	MAP	Appendix A
Meteorological Tower	MET	
Miscellaneous Vents and Drains	MVD	
Moisture Separator & Reheater Drains	MD	
Nitrous Oxide	NX	
Non-Essential Switchgear Air	SGA	
Oxygen	OG	
Propane	PP	Appendix A
RCA Check Point Air Handling	CPA	
Sanitary Piping	SAN	9.2.4.1
Sanitary Lagoon Area	SLA	9.2.4.1
Seal Oil Generator	SO	
Secondary Component Cooling	SCC	
SGFP Turbine Drive A Equipment	TDA	10.4.7.2.b
SGFP Turbine Drive B Equipment	TDB	10.4.7.2.b
Storm Drains	SD	2.4.2.3, 2.4.5.3
Supplementary Emergency Power	SEPS	8.3.1.1.b.9.c
Turbine Building Air Handling	TAH	9.4.15
Turning Gear	TG	
Turbine Generator	TH	10.2.1
Turbine Steam Seal	SSS	

System - Structure	System - Structure ID	UFSAR Reference and Notes
Waste Processing Air Handling	WAH	9.4.4.
Waste Processing Solid	WS	11.4.2
Water Treatment	WT	9.2.3.2, 9.2.3.3
Structures		
Abandoned Old Barn	91	Note 1
Abandoned Sewage Treatment Building	34	Note 1
Administration and Service Building	5	Note 2
Alternative Radiation Protection Check Point	78	Note 2
Asphalt Building	71	Note 2
Chlorination Building	45	Note 2
Condensate Polisher Facility	76	Note 2
Control Building for Meteorological Tower	105	Note 1
Demineralized Water Storage Tank	26	Note 2
Dry (Spent) Fuel Storage Facility	79	Note 1
Electrical Shack	95	Note 1
Employee Allegation Resolution Office	57	Note 1
Equipment Maintenance Facility	59	Note 1
Fabrication Facility	62	Note 1
Fire Protection Facility	61	Note 1
Fitness Center	41	Note 1
Fuel Oil Storage Tank	32	Note 1
Fuel Storage Tanks	87	Note 1
Gas Bottle Storage Facilities	75	Note 2
General Office Building	44	Note 1

System - Structure	System - Structure ID	UFSAR Reference and Notes
Structures		
Guard House	33	Note 2
High Rise Building	63	Note 1
Hydrogen Storage Area	50	Note 1
Intake and Discharge Tunnels	106	Note 4
Lincoln Park Substation	100	Note 3
Lube Oil Storage Building	72	Note 2
Lumber Mill Facility	58	Note 1
Maintenance Facility	73	Note 2
Metal Shack	103	Note 2
Meteorological Tower	36	Note 1
Miscellaneous Construction Trailers	96	Notes 1 & 2
Miscellaneous Cranes	-	Note 5
Miscellaneous Non-operational Bldgs	35	Note 1
North Gate House	89	Note 1
Office Equipment Storage Building	69	Note 1
Oil/Water Separator Vault No 1	51	Note 2
Oil/Water Separator Vault No 2	52	Note 2
Oil/Water Separator Vault No 3	53	Note 1
Operational Support Building	68	Note 1
OPS Training Center	47	Note 1
Permanent Security Fence	42	Note 2
Planning/Projects Trailer	98	Note 1
Production Warehouse	70	Note 1
Radioactive Waste Metal Storage Shack	101	Note 2
Radiation Calibration Facility	48	Note 2

System - Structure	System - Structure ID	UFSAR Reference and Notes
Structures		
Radioactive Controlled Area Storage Facility	74	Note 2
Science and Nature Center	40	Note 1
Sewer Lift Station	104	Note 1
SF_6 Refurbishment & Test Facility	65	Note 1
Shack (Fire Fighting Training)	94	Note 1
Siren Maintenance Facility	60	Note 1
Snow Plow Storage	86	Note 1
South Gate House	90	Note 1
Staging Storage Facility	43	Note 1
Storage Building	93	Note 1
Storage Shack	102	Note 2
Storage Tent	97	Note 1
Sundial Substation	100	Note 3,
Supplemental Emergency Power System Enclosure	77	Note 2
Technical Training Center	64	Note 1
Transformers T45, T46, T47 & Electrical Building for T45, T46, T47	92	Note 1
Unit 1 Abandoned Control Building Make-up Air Intake Structure	99	Note 1
Unit 2 Structure	85	Note 1
Unit 2 Storage Buildings	67	Note 1
Warehouse No 1 M&TE Calibration/Conference Center	54	Note 1
Warehouse No 2	55	Note 1
Warehouse No 3	56	Note 1
Weld Training Center	66	Note 1
West Rye Substation	100	Note 3

System - Structure	System - Structure ID	UFSAR Reference and Notes
Wood Storage Shed	88	Note 1
345kV Termination Center	49	Note 1
Electrical and I&C System		
Campus Power	na	Note 3

Notes:

1. Structure is located outside of the Protected Area and is not safety related. It is not in close proximity to safety related SSCs and is not in scope for 10 CFR 54.4(a)(2). The structure does not house/protect any SSCs that are credited in the CLB for Fire Protection, Environmental Qualification, Pressurized Thermal Shock, Anticipated Transients Without Scram or Station Blackout.

2. Structure is located inside the Protected Area and is not safety related. It is not in close proximity to safety related SSCs and is not in scope for 10 CFR 54.4(a)(2). The structure does not house/protect any SSCs that are credited in the CLB for Fire Protection, Environmental Qualification, Pressurized Thermal Shock, Anticipated Transients Without Scram or Station Blackout.

3. Campus Power distribution network is not safety related and failure of its structures or equipment cannot fail any 10CFR 54.4(a)(1) SSCs. Campus Power does not provide/support any function credited in the CLB for Fire Protection, Environmental Qualification, Pressurized Thermal Shock, Anticipated Transients Without Scram or Station Blackout.

4. The Intake and Discharge Tunnels are not in scope due to the following:

   - The Intake and Discharge Tunnels are not safety related and therefore do not meet the scoping criteria of License Renewal 10 CFR 54.4 (a)(1).

   - Credible, age-related failure of the tunnel would not prevent the satisfactory accomplishment of any License Renewal 10 CFR 54.4 (a)(1) function and therefore does not meet the scoping criteria of License Renewal 10 CFR 54.4 (a)(2).

   - The tunnels do not have a credible Appendix R function and therefore do not meet the scoping criteria of License Renewal 10 CFR 54.4 (a)(3).

5. The active components of the miscellaneous in scope cranes and hoists will be screened out as being active. The passive components are included with the structures where they are located.

2.3 SCOPING AND SCREENING RESULTS: MECHANICAL

2.3.1 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

The following systems are addressed in this section:

- Reactor Coolant System (2.3.1.1)
- Reactor Vessel (2.3.1.2)
- Reactor Vessel Internals (2.3.1.3)
- Steam Generator (2.3.1.4)

2.3.1.1 Reactor Coolant System

System Description

The Reactor Coolant System consists of four 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 tank, 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 Reactor Coolant System 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 Reactor Coolant System 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 used in chemical shim control.

The Reactor Coolant System 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.

Reactor Coolant System 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 from the pressurizer provide for steam discharge to the pressurizer relief tank, where the steam is condensed and cooled by mixing with water.

Reactor Coolant System Components

1. *Reactor Vessel (Evaluated Separately)*

   The Reactor Vessel is cylindrical, with a welded hemispherical bottom head and a removable, flanged and gasketed, hemispherical upper head. The vessel contains the core, core supporting structures, control rods, and other parts directly associated with the core. The vessel has inlet and outlet nozzles located in a horizontal plane just below the Reactor Vessel 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.

2. *Steam Generators (Evaluated Separately)*

   The Steam Generators are vertical shell and U-tube evaporators with integral moisture separating equipment. The Reactor Coolant flows through the inverted U-tubes entering and leaving through the nozzles located in the hemispherical bottom head of the Steam Generator. Steam is generated on the shell side and flows upward through the moisture separators to the outlet nozzle at the top of the vessel.

3. *Reactor Coolant Pumps*

   The Reactor Coolant pumps are identical single speed centrifugal units driven by water/air cooled, three phase induction motors. The internal parts of the motor are cooled by air which is routed through external water/air heat exchangers. The shaft is vertical, with the motor mounted above the pump. A flywheel on the shaft above the motor provides additional inertia to extend pump coast down. The inlet is at the bottom of the pump and the discharge on the side.

4. *Piping*

   The Reactor Coolant loop piping is specified in sizes consistent with system requirements. The hot leg inside diameter is 29 inches and the inside diameter of the cold leg return line to the Reactor Vessel is 27½ inches. The piping between the Steam Generator and the pump suction is increased to 31 inches in inside diameter to reduce pressure drop and improve flow conditions to the pump suction.

5. *Pressurizer*

   The pressurizer is a vertical, cylindrical vessel with hemispherical top and bottom heads. Electrical heaters are installed through the bottom head of the vessel while the spray nozzle, relief and safety valve connections are located in the top head of the vessel.

6. *Safety and Relief Valves*

   The pressurizer safety valves are of the totally enclosed pop-type. The valves are spring loaded, self-activated, with back pressure compensation. The power-operated relief valves limit system pressure in the event of a large power mismatch. They are operated automatically or by remote manual control. Remotely operated valves are provided to isolate the inlet to the power-operated valves if excessive leakage occurs. Steam from the pressurizer safety and relief valves is discharged into the Pressurizer Relief Tank, where it is condensed and cooled by mixing with water near ambient temperature.

7. *Pressurizer Relief Tank*

   The tank is a horizontal, cylindrical vessel with elliptical dished heads. The vessel is constructed of austenitic stainless steel and is overpressure protected in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, by means of two safety heads with stainless steel rupture discs. A flanged nozzle is provided on the tank for the pressurizer discharge line connection to the sparger pipe. The tank is also equipped with an internal spray connected to a cold water inlet and a bottom drain, which are used to cool the tank following a discharge.

8. *Pressurizer Relief Tank Pump*

   The Pressurizer Relief Tank pump is an end suction centrifugal pump with totally enclosed, fan cooled motor. The pump is used to circulate water through the Pressurizer Relief Tank heat exchanger to cool the Pressurizer Relief Tank following a discharge by the pressurizer safety relief valves or power operated relief valves. The pump is also used to transfer the cooled fluid to the Waste Processing Liquid System.

9. *Pressurizer Relief Tank Heat Exchanger*

   This heat exchanger is a horizontal shell and tube type. It is cooled by primary component cooling water to remove heat from the liquid following a discharge by the safety relief valves or power operated relief valves.

In-Scope Boundary Description

The Reactor Coolant System boundary includes the pressurizer, Reactor Coolant pumps and their oil lift system, hot leg and cold leg piping, Pressurizer Relief Tank, pressurizer heaters, pressurizer surge line, and pressurizer spray line, including the auxiliary spray piping back to its first isolation valve.

The Reactor Coolant System scoping boundary begins at the Reactor Vessel outlet nozzle safe end-to-pipe welds, continues through the hot leg piping to the Steam Generator inlet nozzle safe end-to-pipe welds. The Steam Generators are evaluated as a separate license renewal system. The Reactor Coolant System boundary continues from the Steam Generator outlet safe end-to-pipe welds through the cold leg piping to the suction of the Reactor Coolant pump. The Reactor Coolant System boundary continues from the Reactor Coolant pump discharge through the cold leg piping to the Reactor Vessel inlet nozzle pipe-to-safe end welds. The Reactor Vessel is evaluated as a separate license renewal system. The pressurizer surge line that is connected from the hot leg to the pressurizer lower head is included in the

Reactor Coolant System boundary, as well as the pressurizer spray lines that are connected from the cold leg piping to the spray nozzle, internal to the pressurizer.

PID-1-RC-LR20845:

The Reactor Coolant System scoping boundary includes the Reactor Vessel head vent piping from the vessel head nozzle to the Pressurizer Relief Tank.

The scoping boundary includes the Reactor Vessel Level Instrumentation System (RVLIS) line beginning at the restricting orifice located at the upper head penetration and on to the reference leg instrument, to capillary tubing through a containment penetration, and termination at a level transmitter. The sensing line for RVLIS begins at the lower head instrumentation nozzle-to-guide tube weld, passes through the seal table, and terminates at the level devices. The boundary continues from the level device via capillary lines to the containment penetration, and terminates at both level and pressure transmitters. Also included in the boundary are the incore instrument guide tubes.

The drain lines from the inner and outer head flange O-ring seals begin at the vessel nozzles welds, and terminate at the Reactor Coolant drain tank.

PID-1-RC-LR20846:

The Reactor Coolant System scoping boundary includes the pressurizer attached piping, and code safety valves and power-operated relief valves with discharge lines.

The pressurizer steam and liquid space sample lines each pass through flex hose, capillary tubing, and various valves to the inside containment isolation valve where the two lines join. The single line exits containment through the outside containment isolation solenoid valve where the boundary terminates at the inlet to the pressurizer liquid and steam sample heat exchanger.

The pressurizer instrument lines and heaters are in scope. The pressurizer relief lines to the safety valves and pressure control valves are in the scope of the Reactor Coolant System. Discharge from these lines vents to the Pressurizer Relief Tank. The Pressurizer Relief Tank, pump, heat exchanger, instrumentation and connected pipes and valves are in scope.

Pressurizer spray lines from the Reactor Coolant cold legs each include a pressure control valve and a bypass line/throttle valve around the pressure control valve, then join to a single spray line and terminates at the pressurizer spray nozzle.

PID-1-RC-LR20841:

The boundary consists of safety related components that provide the Loop 1 flow path from the Reactor Vessel to the Steam Generator, then to Reactor Coolant pump, and back to the Reactor Vessel, the branch lines that provide a pressure boundary for the Reactor Coolant piping and the piping to the pressurizer. The non-safety related boundary consists of the components that interface with the seal connections on the Reactor Coolant pumps and the drain line components downstream of the safety related boundary.

PID-1-RC-LR20842:

The boundary consist of safety related components that provide the Loop 2 flow path from the Reactor Vessel to the Steam Generator, then to Reactor Coolant pump, and back to the Reactor Vessel and the branch lines that provide a pressure boundary for the Reactor Coolant piping. The non-safety related boundary consists of the components that interface with the seal connections on the Reactor Coolant pumps and the drain line components downstream of the safety related boundary.

PID-1-RC-LR20843:

The boundary consists of safety related components that provide the Loop 3 flow path from the Reactor Vessel to the Steam Generator, then to Reactor Coolant pump, and back to the Reactor Vessel, and the branch lines that provide a pressure boundary for the Reactor Coolant piping and the piping to the pressurizer. The non-safety related boundary consists of the components that interface with the seal connections on the Reactor Coolant pumps and the drain line components downstream of the safety related boundary.

PID-1-RC-LR20844:

The boundary consists of safety related components that provide the Loop 4 flow path from the Reactor Vessel to the Steam Generator, then to Reactor Coolant pump, and back to the Reactor Vessel and the branch lines that provide a pressure boundary for the Reactor Coolant piping. The non-safety related boundary consists of the components that interface with the seal connections on the Reactor Coolant pumps and the drain line components downstream of the safety related boundary.

PID-1-CS-LR20722:

The boundary consists of safety related piping that interfaces with the regenerative heat exchanger in the Chemical and Volume Control System.

PID-1-RH-LR20662:

The boundary consists of safety related components that provide a flow path to the Residual Heat Removal Pump “A” and branch lines to instruments. The non-safety related boundary consists of the drain line components downstream of the safety related boundary.

PID-1-RH-LR20663:

The boundary consists of safety related components that provide a flow path to the Residual Heat Removal Pump “B” and branch lines to instruments. The non-safety related boundary consists of the drain line components downstream of the safety related boundary.

PID-1-SI-LR20448:

The boundary consists of safety related components which are the same components that are shown on PID-1-RH-LR20662 and PID-1-RH-LR20663. These components provide a flow path to the Residual Heat Removal Pumps “A” and “B” and the branch lines to instruments. The non-safety related boundary consists of the components that are shown on PID-1-RH-LR20662 and PID-1-RH-LR20663, which are the drain line components downstream of the safety related boundary.

PID-1-SI-LR20450:

The boundary consists of non-safety related drain piping that interfaces with the Safety Injection System.

PID-1-SS-LR20518:

The boundary consists of safety related pressure boundary components for penetrations X-35 and X-40. The non-safety related boundary consists of the drain and vent components downstream of the safety related components, and the components in process lines that interface with the Sample System.

PID-1-SS-LR20520:

The boundary consists of non-safety related drain piping that interfaces with the Sample System.

PID-1-VSL-LR20777:

The boundary consists of non-safety related drain piping that interfaces with the Valve Stem Leak-off System and Waste Processing Liquid Drains System.

PID-1-WLD-LR20218:

The boundary consists of the safety related pressure boundary that interfaces with the Waste Processing Liquid Drain System. The non-safety related components which are the drain piping components that interface with the Waste Processing Liquid Drains System.

PID-1-WLD-LR20219:

The boundary consists of non-safety related drain piping that interfaces with the Waste Processing Liquid Drains System.

PID-1-WLD-LR20221:

The boundary consists of non-safety related drain piping that interfaces with the Waste Processing Liquid Drains System.

The Reactor Coolant System scoping boundary also includes the pressure retaining portions of Reactor Coolant System instrumentation and its associated piping, tubing, and instrumentation root valves.

Interfacing Systems

Not included in the Reactor Coolant System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Chemical and Volume Control System
- Nitrogen Gas System
- Residual Heat Removal System
- Reactor Makeup Water System
- Reactor Vessel
- Reactor Vessel Internals
- Safety Injection System
- Sample System
- Steam Generators
- Valve Stem Leak-off System
- Vent Gas System
- Waste Processing Liquid Drains System

System Intended Functions

Provide a pressure boundary capable of accommodating temperatures and pressures associated with operational transients.	10 CFR 54.4(a)(1)
Provide adequate flow to the Steam Generator to transfer the heat from the core to the steam and power conversion systems.	10 CFR 54.4(a)(1)
Transfer residual heat from the reactor core to the residual heat removal system during cool down and subsequent shutdown.	10 CFR 54.4(a)(1)
Provide the water used as the neutron moderator and reflector, and as a solvent for chemical shim (boric acid) control.	10 CFR 54.4(a)(1)
Establish and maintain Reactor Coolant System pressure.	10 CFR 54.4(a)(1)
Provide overpressure protection for the Reactor Coolant System.	10 CFR 54.4(a)(1)
Reactor Coolant pressure boundary accommodates volume changes in Reactor Coolant during transient conditions.	10 CFR 54.4(a)(1)
Provide alarms, interlocks, display, control, and protection functions to enable safe operation and shut down of the Reactor Coolant System and other subsystems. This function includes Post Accident Monitoring instrumentation / indications.	10 CFR 54.4(a)(1)
Provide Containment Isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Anticipated Transients Without Scram (ATWS).	10 CFR 54.4(a)(3)

This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 1.2.3.2
- Section 5.1
- Section 5.2
- Table 6.2-83
- Section 7.2
- Table 7.5-1
- Table 7.5-2

License Renewal Drawings

- PID-1-CS-LR20722
- PID-1-RC-LR20841
- PID-1-RC-LR20842
- PID-1-RC-LR20843
- PID-1-RC-LR20844
- PID-1-RC-LR20845
- PID-1-RC-LR20846
- PID-1-RH-LR20662
- PID-1-RH-LR20663

- PID-1-SI-LR20448
- PID-1-SI-LR20450
- PID-1-SS-LR20518
- PID-1-SS-LR20520
- PID-1-VSL-LR20777
- PID-1-WLD-LR20218
- PID-1-WLD-LR20219
- PID-1-WLD-LR20221

Table 2.3.1-1 Reactor Coolant System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Bolting (Class 1)	Pressure Boundary
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary
Heat Exchanger Components	Heat Transfer Leakage Boundary (Spatial) Pressure Boundary
Incore Instrument Guide Tube	Pressure Boundary
Orifice (Class 1)	Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping and Fittings (Class 1)	Pressure Boundary
Piping and Fittings (Class 1 < 4 inches)	Pressure Boundary
Pressurizer Components	Pressure Boundary
Pressurizer Diaphragm Plate	Pressure Boundary
Pressurizer Heater Sleeves	Pressure Boundary
Pressurizer Integral Support	Pressure Boundary
Pressurizer Manway Cover	Pressure Boundary
Pressurizer Nozzle	Pressure Boundary
Pressurizer Nozzle Safe End	Pressure Boundary
Pressurizer Spray Head	Spray
Pump Casing	Leakage Boundary (Spatial)
Pump Casing (Class 1)	Pressure Boundary
Reactor Coolant System Piping and Fittings	Pressure Boundary
Rupture Disk	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)

Component Type	Intended Function
	Pressure Boundary
Thermowell (Class 1)	Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary
Valve Body (Class 1)	Pressure Boundary

The aging management review results for these components are provided in Table 3.1.2-1, Summary of Aging Management Evaluation - Reactor Coolant System.

2.3.1.2 Reactor Vessel

System Description

The Reactor Vessel is a cylinder with a welded hemispherical bottom head and a removable, flanged hemispherical upper head. The vessel contains the core, core supporting structures, control rods, and other parts directly associated with the core.

The vessel has four inlet and four outlet nozzles located in a horizontal plane just below the Reactor Vessel 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.

Two O-ring seals are installed between the mating surfaces of the closure head flange and the Reactor Vessel flange. The O-ring seals prevent leakage of the primary coolant between the vessel and the closure head. Two head seal monitoring connections are used to detect seal leakage. One detects leakage between the inner and outer seals, while the other detects leakage outside the outer seal. Piping and various valves are used to direct any leakage to the Reactor Coolant Drain Tank.

Both the upper and lower Reactor Vessel heads contain penetrations which are used for instrumentation or control devices. The lower Reactor Vessel head has penetrations for 58 incore nuclear instrumentation thimbles, while the vessel upper head contains 79 control rod drive mechanism (CRDM) penetrations. A threaded, 316 stainless steel adapter is welded to the upper end of each tube. CRDM housings are attached to 57 of these adapters. The housings are threaded onto the adapters and seal welded. The remaining penetrations in the upper head were originally designed to be used for incore thermocouple access points and part-length CRDMs. Due to design changes, neither are utilized at Seabrook Station. Therefore, the penetrations are capped and seal welded. One of the capped penetrations, however, is used by the Reactor Vessel Level Instrumentation System (RVLIS). A 1-inch pipe is connected to the cap, and spool pieces allow for removal when the upper head is removed from the vessel.

There is also a 1-inch penetration in the upper head which is used as a vent path for the vessel. An Inconel tube passes through the penetration and is welded to the interior of the head.

The Reactor Vessel is supported by steel pads on four of the coolant nozzles. The pads rest on steel base plates atop a support structure that is attached to the concrete foundation wall. There are also three lifting lugs evenly spaced around the upper head, which are used to move it.

The six core support lugs provide rotational support/stability for the Reactor Vessel Internals.

In-Scope Boundary Description

PID-1-RC-LR20845:

The Reactor Vessel boundary begins at the Reactor Vessel inlet nozzle safe ends and includes the Reactor Vessel shell, core support lugs, lower head, upper head and head flange, and terminates at the outlet nozzle safe ends. There are a series of plates and baffles assisting in flow distribution through the core. These plates and baffles are separately evaluated with the Reactor Vessel Internals.

The license renewal scoping boundary of the Reactor Vessel encompasses the Reactor Vessel, including the Reactor Vessel shell, flange, Reactor Vessel lower head, upper head assembly, primary nozzles and nozzle supports, the control rod drive mechanisms and housings, closure studs, flange metal o-rings, and the flange leak-off nozzles. The control rod drive system drive shafts are in the scope of the Reactor Vessel Internals and are not evaluated here. The upper head RVLIS instrument nozzle, up to but not including the restricting orifice, is in the scope of Reactor Vessel. The remaining portion of the reactor vessel level instrumentation system is evaluated separately with the Reactor Coolant System.

The head vent nozzle, up to but not including the pipe weld, is in the scope of the Reactor Vessel.

The scoping boundary also includes the Reactor Vessel shell, flange, primary nozzles, primary nozzle safe ends, and nozzle supports.

Also included in the Reactor Vessel scoping boundary are the Reactor Vessel lower head and the incore monitoring tubing assemblies from inside of the vessel, through the vessel penetration tubes, and terminating at the vessel weld joint to the thimble guide tubes.

The Reactor Vessel nozzles include the four (4) inlet nozzles, four (4) outlet nozzles, and control rod drive mechanism nozzles. The boundary includes control rod drive mechanism housings as well as the lower head tubing assemblies for incore thimbles and instrumentation.

Interfacing Systems

Not included in the Reactor Vessel license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Reactor Vessel Internals
- Reactor Coolant System

System Intended Functions

Provide Reactor Coolant pressure boundary. The Reactor Vessel is an integral part of the Reactor Coolant system pressure boundary and is capable of accommodating the temperatures and pressures associated with the operational transients.	10 CFR 54.4(a)(1)
The Reactor Vessel functions to support the reactor core and control rod drive mechanisms.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Pressurized Thermal Shock (PTS).	10 CFR 54.4(a)(3)

UFSAR References

- Section 5.1
- Section 5.2

License Renewal Drawing:

- PID-1-RC-LR20845

Table 2.3.1-2 Reactor Vessel
Components Subject to Aging Management Review

Component Type	Intended Function
Canopy Seal Pressure Housing	Pressure Boundary
Closure Head Components	Pressure Boundary
Control Rod Drive Pressure Housing	Pressure Boundary
External Vessel Attachments	Structural
Reactor Vessel Bottom Instrument Tube	Pressure Boundary
Reactor Vessel Closure Head	Pressure Boundary
Reactor Vessel Closure Head Bolting	Pressure Boundary
Reactor Vessel Control Rod Drive Flange Bolting	Pressure Boundary
Reactor Vessel Control Rod Drive Penetration Nozzle and Welds	Pressure Boundary
Reactor Vessel Core Sup Pads/ Guide Lugs	Structural
Reactor Vessel Flange	Pressure Boundary
Reactor Vessel Head Vent Pipe	Pressure Boundary
Reactor Vessel Nozzle Safe Ends and Welds	Pressure Boundary
Reactor Vessel Primary Inlet and Outlet Nozzles	Pressure Boundary
Reactor Vessel Primary Inlet and Outlet Nozzle Welds	Pressure Boundary
Reactor Vessel Shell	Pressure Boundary

The aging management review results for these components are provided in Table 3 1.2-2, Summary of Aging Management Evaluation - Reactor Vessel.

2.3.1.3 Reactor Vessel Internals

System Description

The components of the Reactor Vessel Internals are divided into three parts consisting of the lower core support structure (including the entire core barrel and neutron shield pad assembly), the upper core support structure and the incore instrumentation support structure. The Reactor Vessel Internals support the core, maintain fuel alignment, limit fuel assembly movement, maintain alignment between fuel assemblies and control rod drive mechanisms, direct coolant flow past the fuel elements, direct coolant flow to the pressure vessel head, provide gamma and neutron shielding, and provide guides for the incore instrumentation. The coolant flows from the vessel inlet nozzles down the annulus between the core barrel and the vessel wall and then into a plenum at the bottom of the vessel. It then reverses and flows up through the core support and through the lower core plate. The lower core plate is sized to provide the desired inlet flow distribution to the core. After passing through the core, the coolant enters the region of the upper support structure and then flows radially to the core barrel outlet nozzles and directly through the vessel outlet nozzles. A small portion of the coolant flows between the baffle plates and the core barrel to provide additional cooling of the barrel. Similarly, a small amount of the entering flow is directed into the vessel head plenum and exits through the vessel outlet nozzles.

Lower Core Support Structures

The major containment and support member of the Reactor Vessel Internals 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, the core support which is welded to the core barrel, reactor fuel, and rod cluster control assemblies. 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 reactor vessel 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 the core barrel serve to provide passageways and control for the 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 core support of the core barrel to provide stiffness and to transmit the core load to the core support. Adequate coolant distribution is obtained through the use of the lower core plate and 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, and are approximately 48 inches wide by 148 inches long by 2.8 inches thick. The pads are located azimuthally to provide the required degree of vessel protection. Specimen guides in which material surveillance samples can be inserted and irradiated during reactor operation are attached to the pads. The samples are held in the guides by a preloaded spring device at the top and bottom to prevent sample movement.

The main radial support system of the lower end of the core barrel is accomplished by "key" and "keyway" joints to the reactor vessel 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. With this design, the internals are provided with a support at the furthest extremity, and may be viewed as a beam supported at the top and bottom.

Upper Core Support Assembly

The upper core support assembly, consists of the top 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 top 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 top support plate, and are restrained by pins in the upper core plate for proper orientation and support. Additional guidance for the control rod drive shafts is provided by the upper guide tube which is attached to the upper support plate and guide tube.

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. At an elevation in the core barrel where the upper core plate is positioned, the flat-sided pins are located at angular positions of 90 degrees from each other. Four slots are milled into the core plate at the same positions. As the upper support structure is lowered into the main internals, the slots in the plate engage the flat-sided pins in the axial direction. 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 reactor vessel head flange.

Incore Instrumentation Support Structures

The incore instrumentation support structure consists of a guide tubing system to convey and support flux thimbles penetrating the vessel through the bottom. Each flux thimble assembly includes five fixed neutron flux detectors, a thimble tube for a movable neutron flux detector, and a thermocouple. The thimble guide tubes extend from the seal table down through the concrete shield area and terminate in socket welds at the reactor vessel bottom head penetrations. The guide tube bend radius is 12 feet. The Inconel flux thimble assemblies extend through the guide tubing and vessel penetrations, through hollow passages in the lower internals, and finally through instrumentation support tubes in the fuel assemblies. The thimbles remain in place during operation but are pulled back approximately 13 feet at the seal table during refueling to avoid interference within the core. The thimbles are closed at the leading ends and sealed against the guide tubes at the seal table. Mechanical seals between the retractable thimbles and conduits are provided at the seal line. During normal operation, the retractable thimbles are stationary and move only during refueling or for maintenance, at which time a space of approximately 15 feet above the seal line is cleared for the retraction operation.

In-Scope Boundary Description

The components of the Reactor Vessel Internals are divided into three parts consisting of the lower core support structure (including the entire core barrel and neutron shield pad assembly), the upper core support structure, and the incore instrumentation support structure.

The lower internals assembly (lower core support structure) consists of the core barrel, core baffle and former plates, lower core plate and support column assembly, neutron shield pads (panels) with attached specimen holders, and the lower core support forging. The fuel assemblies and the rod cluster control assemblies, control rod drive shafts, spider assemblies and control rodlets are included in the scope of Reactor Vessel Internals.

The upper core support assembly consists of the top support plate assembly and the upper core plate, between which are contained support columns and guide tube assemblies. The guide tube assemblies are fastened to the top support plate, and are restrained by pins in the upper core plate for proper orientation and support. 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. 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.

The incore instrumentation support structure consists of a guide tubing system to convey and support flux thimbles penetrating the vessel through the bottom.

Interfacing Systems

Not included in the Reactor Vessel Internals license renewal scoping boundaries is the following interfacing system, which is separately evaluated as a license renewal system:

- Reactor Vessel

System Intended Functions

The Reactor Vessel Internals support the core, maintain fuel alignment between fuel assemblies and control rods, direct coolant flow to the vessel head, provide gamma and neutron shielding and guide the incore instruments.	10 CFR 54.4(a)(1)

UFSAR References

- Section 3.9(N).5.1

License Renewal Drawings

There are no License renewal Boundary drawings for the Reactor Vessel Internals. The internals are described in associated vendor manuals and industry reports.

Table 2.3.1-3 Reactor Vessel Internals
Components Subject to Aging Management Review

Component Type	Intended Function
Baffle and Former Plates	Direct flow Structural Support
Baffle and Former Bolts	Structural Support
Bottom Support Forging	Direct Flow Structural Support
Clevis Inserts	Structural Support
Clevis Insert Bolts	Structural Support
Core Barrel and Core Barrel Flange	Direct Flow Structural Support
Core Barrel Outlet Nozzles	Direct Flow Structural Support
Flux Thimble Guide Tubes	Structural Support
Flux Thimble Tubes	Pressure Boundary
Hold Down Spring	Structural Support
Lower Core Plate	Direct Flow Structural support
Lower Core Support Columns	Structural Support
Lower Fuel Alignment Pins	Structural Support
Lower Radial Support Keys	Structural Support
Lower Support Column Bolts	Structural Support
Rod Control Cluster Bolts	Structural Support
Rod Control Cluster Pins	Structural Support

Component Type	Intended Function
Rod Control Cluster Tubes	Structural Support
Thermal Shield	Structural Support
Upper Core Plate	Direct Flow Structural Support
Upper Core Plate Pins	Structural Support
Upper Fuel Alignment Pins	Structural Support
Upper Support Column	Structural Support
Upper Support Column Bolts	Structural Support
Upper Support Plate	Structural Support

The aging management review results for these components are provided in Table 3.1.2-3, Summary of Aging Management Evaluation - Reactor Vessel Internals.

2.3.1.4 Steam Generator

System Description

When the Reactor Coolant System is operating, the Reactor Coolant pumps move the pressurized water (coolant) through the vessel and the loops. The water, which cools the core and moderates the nuclear reaction, picks up the heat of fission (thermal energy) as it passes through the core. The thermal energy in the water is carried to the Steam Generators, where it is transferred across the U-tubes to the secondary side. The coolant is then returned to the core inlet by the Reactor Coolant pumps to continue the energy removal process.

Each Steam Generator includes a primary section called the tube side (major components include hemispherical channel head with a divider plate, tube sheet, and U-tubes). The channel head makes up the bottom of the Steam Generator. The head resembles an inverted bowl divided into inlet and outlet sections by a plate. Flow from the core enters the primary side of the Steam Generator through the inlet nozzle of the channel head. From the inlet chamber, reactor coolant flows upward through the tube sheet and into the U-tubes. The heat from fission carried by the primary coolant is transferred through the U-tubes to the fluid on the secondary side. Primary flow continues upward toward the U-bend, back down the other side, through the tube sheet and into the outlet chamber of the channel head. The primary water exits the channel head through the outlet nozzle on its way to the suction of the Reactor Coolant pump. The Reactor Coolant pump returns the flow to the reactor vessel.

The lower shell of the Steam Generator is a vertical cylinder. The tube sheet is welded to the bottom of the cylinder. Above the top of the U-tubes, the shell bevels out via a transition cone to the larger diameter of the upper shell. The upper shell houses the moisture separation equipment.

The secondary section of the Steam Generator is referred to as the shell side and consists of the following major components: shell, feedwater connection and ring, tube bundle and wrapper, moisture separators, steam outlet connection, and blowdown and drain connections. feedwater enters the secondary side of the Steam Generator through a normally submerged feed ring located just above the transition cone. The feed ring is a doughnut-shaped pipe perforated around its circumference on the top side. Inverted J-tubes extend from the perforations to direct feedwater flow downward. The feedwater flow passes along the inside of the shell (downcomer annulus) to the tube sheet. Cold feedwater is initially kept from contact with the U-tubes by the tube bundle wrapper. The tube bundle wrapper acts as a second shell inside the first. It does not, however, extend all the way down to the tube sheet. feedwater enters the tube bundle region in the space between the tube bundle wrapper and the tube sheet. In the tube bundle, the Feedwater is heated to a saturated liquid and is then transformed to a mixture of steam and water that rises upward to the moisture separation equipment. The two moisture separator stages remove the saturated liquid from the wet mixture. The moisture is then directed to the recirculating water plenum, where it joins the feedwater and is preheated prior to entering the downcomer. The steam (saturated vapor) rises out the top of the Steam Generator, leaving through the outlet connection to the main steam system.

Level instrumentation provides information to the plant operators and provides input signals to the solid state protection system to trip the reactor, trip the turbine, isolate main feedwater and start the emergency Feedwater System. One level instrument in each Steam Generator provides an input signal to the ATWS Mitigating System.

In-Scope Boundary Description

The Steam Generator scoping boundary includes those portions of the four (4) Steam Generators associated with maintaining the reactor coolant pressure boundary, and the secondary side pressure boundary. The primary side boundary begins at the inlet primary nozzle safe end, to the safe end to nozzle weld, on to the primary nozzle and into the primary channel head. The channel head has a partition plate which separates the channel head into two volumes, an intake and a discharge section. Upon entering the partitioned channel head, primary water flows through the tube sheet, through the U-tubes, enters the channel head discharge region, and exits the channel head via the outlet primary nozzle safe end.

The secondary side boundary begins at the feedwater nozzle. Feedwater flows through the nozzle and thermal sleeve into the feedwater inlet ring and out through the J-tubes. The supports for the inlet ring are in scope for the Steam Generator. Feedwater flows into the region above the lower deck plate. From there Feedwater flows into the downcomer, down to the tube sheet, through the flow distribution baffle into the heating and up along the U-tubes. After exiting the U-tube region, the steam-water mixture flows up and exits the Steam Generator steam outlet nozzle containing the flow limiting device into the Main Steam System.

Instrument nozzles for level measurement are in the scope of the Steam Generator. Level instruments, associated piping and valves are addressed in Feedwater System evaluation.

The blowdown and secondary shell drain taps are in scope for the Steam Generator. The piping connected to these taps are in the scope of the Steam Generator Blowdown System. The primary channel head drain nozzle is in scope for the Steam Generator but the attached pipe is in the scope of the Reactor Coolant System.

Primary manways, secondary manways and secondary hand holes are in scope for the Steam Generator.

Interfacing Systems

Not included in the Steam Generator license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Feedwater System
- Main Steam System
- Reactor Coolant System
- Steam Generator Blowdown System

System Intended Functions

Transfer the heat produced during power operation from the Reactor Coolant to the steam and power conversion systems.	10 CFR 54.4(a)(1)
Provide a pressure boundary capable of accommodating temperatures and pressures associated with operational transients.	10 CFR 54.4(a)(1)
Limit steam flow from the Steam Generator in the event of a Main Steam line break.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Anticipated Transients Without Scram (ATWS).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 5.1
- Section 5.4.2
- Section 10.3.2.2
- Section 10.4.7
- Figure 5.4.4

License Renewal Drawings

- PID-1-FW-LR20686
- PID-1-MS-LR20580
- PID-1-MS-LR20581
- PID-1-RC-LR20841
- PID-1-RC-LR20842
- PID-1-RC-LR20843
- PID-1-RC-LR20844

Table 2.3.1-4 Steam Generator
Components Subject to Aging Management Review

Component Type	Intended Function
Orifice	Pressure Boundary Throttle
Steam Generator Anti-Vibration Bars	Structural Support
Steam Generator Channel Head Drain Pipe	Pressure Boundary
Steam Generator Channel Head Drain Pipe Coupling	Pressure Boundary
Steam Generator Divider Plate	Pressure Boundary
Steam Generator Feedwater Inlet Ring	Pressure Boundary
Steam Generator Feedwater Inlet Ring Support	Structural Support
Steam Generator Feedwater Nozzle	Pressure Boundary
Steam Generator Lower Heads	Pressure Boundary
Steam Generator Lower Shell	Pressure Boundary
Steam Generator Primary Closure Bolting	Pressure Boundary
Steam Generator Primary Manways	Pressure Boundary
Steam Generator Primary Nozzle	Pressure Boundary
Steam Generator Primary Nozzle Safe End	Pressure Boundary
Steam Generator Primary Nozzle Weld	Pressure Boundary
Steam Generator Secondary Closure Bolting	Pressure Boundary
Steam Generator Secondary Hand Holes	Pressure Boundary
Steam Generator Secondary Manways	Pressure Boundary
Steam Generator Shell Penetrations	Pressure Boundary

Component Type	Intended Function
Steam Generator Steam Nozzle	Pressure Boundary
Steam Generator Top Head	Pressure Boundary
Steam Generator Transition Cone	Pressure Boundary
Steam Generator Tube Bundle Wrapper	Direct Flow
Steam Generator Tube Plugs	Pressure Boundary
Steam Generator Tube Support Plates	Structural Support
Steam Generator Tubes	Heat Transfer Pressure Boundary
Steam Generator Tubesheet	Pressure Boundary
Steam Generator Upper Shell	Pressure Boundary

The aging management review results for these components are provided in Table 3.1.2-4, Summary of Aging Management Evaluation - Steam Generator.

2.3.2 ENGINEERED SAFETY FEATURES

NUREG-1801 *"Generic Aging Lessons Learned (GALL) Report"*, Volume 2, Chapter V, Engineered Safety Features, lists the Containment Spray System, Containment Isolation Components, and Emergency Core Cooling System as the Engineered Safety Features (ESF) systems for a pressurized water reactor (PWR).

Seabrook Station UFSAR Section 6 defines the Engineered Safety Features systems as follows:

- Containment Systems (Containment Structure, Containment Heat Removal System known as Containment Building Spray, Secondary Containment, Containment Isolation System, and Combustible Gas Control System)
- Emergency Core Cooling System
- Habitability Systems (Control Building Air Handling System)
- Fission Product Removal and Control Systems (Containment Enclosure Air Handling System, Containment Building Spray, Fuel Storage Building Air Handling, and Control Building Air Handling System)
- Emergency Feedwater System

In order to maintain alignment with the NUREG-1801 format, this application describes the following ESF Systems in this section:

- Combustible Gas Control System (2.3.2.1)
- Containment Building Spray System (2.3.2.2)
- Residual Heat Removal System (2.3.2.3)
- Safety Injection System (2.3.2.4)

The remaining ESF systems listed in UFSAR Section 6 are described in the following sections of the application:

- Chemical and Volume Control System (2.3.3.3)
- Containment Enclosure Air Handling System (2.3.3.7)
- Containment Structures (2.4.2)

- Control Building Air Handling System (2.3.3.9)
- Emergency Feedwater System (included in Feedwater System, 2.3.4.6)
- Fuel Storage Building Air Handling System (2.3.3.18)

Following is a discussion of the Seabrook Emergency Core Cooling System and the Containment Isolation System.

Emergency Core Cooling System (ECCS)

The Emergency Core Cooling System is comprised by four systems (Chemical and Volume Control System, Safety Injection System, Residual Heat Removal System, and Containment Building Spray System) that provide the following functions:

- High Head Injection is supplied by the Chemical and Volume Control System
- Intermediate Head Injection is supplied by the Safety Injection System
- Accumulator Injection is supplied by the Safety Injection System
- Low Head Injection is supplied by the Residual Heat Removal System
- Borated Water Supply is provided by the Containment Building Spray System

The System Description, In-Scope Boundary Description, Interfacing Systems, System Intended Functions, UFSAR References, License Renewal Drawings, and the Table for Components Subject to Aging Management Review are provided separately for each system; Chemical and Volume Control System (2.3.3.3), Safety Injection System (2.3.2.4), Residual Heat Removal System (2.3.2.3), and Containment Building Spray System (2.3.2.2).

The high head injection portion of the Chemical and Volume Control System, the Safety Injection System (which provides intermediate head injection), and the Residual Heat Removal System (which provides low head injection) together form the ECCS discussed in section 6.3.1 of the UFSAR.

The primary function of the ECCS following an accident is to remove the stored and fission product decay heat from the reactor core so that fuel rod damage, to the extent that it would impair effective cooling of the core, is prevented.

The ECCS consists of the Chemical and Volume Control System centrifugal charging pumps, Safety Injection System pumps, Safety Injection System accumulators, Residual Heat Removal System pumps, Residual Heat Removal System heat exchangers, and a Containment Building Spray System refueling water storage tank (RWST), and the associated piping and valves.

The RWST supplies the borated water used for the injection phase of the ECCS. When the RWST level drops to the low-low level alarm point, the injection phase is discontinued and recirculation is initiated.

During the injection phase, the two centrifugal charging pumps operate to inject RWST water into the cold legs of all four loops (high head injection). Once the Reactor Coolant System pressure is below the shutoff head of the two Safety Injection pumps, they begin to take borated water from the RWST and deliver it to the cold legs of the four loops (intermediate head injection). The Safety Injection accumulators will discharge their contents into the four Reactor Coolant System cold legs when Reactor Coolant System pressure decreases below accumulator shutoff pressure. The two Residual Heat Removal pumps take water from the RWST and inject it into the cold legs of all four Reactor Coolant System loops via the accumulator discharge lines once the Reactor Coolant System pressure drops below the shutoff head of the Residual Heat Removal pumps (low head injection).

In the recirculation phase, the containment sump valves are opened to provide suction directly to the Residual Heat Removal pumps which in turn supplies suction water to the centrifugal charging pumps and Safety Injection pumps.

The System Description, In-Scope Boundary Description, Interfacing Systems, System Intended Functions, UFSAR References, License Renewal Drawings, and the Table for Components Subject to Aging Management Review are provided separately for the Residual Heat Removal System and the Safety Injection System. Additionally, for license renewal purposes, the Chemical and Volume Control System, including the ECCS high head injection portion, is included in the Chemical and Volume Control System (2.3.3.3). Furthermore, the RWST is part of the Containment Building Spray System and therefore, included in the Containment Building Spray System (2.3.2.2).

Containment Isolation System

The Containment Isolation System as described in the USFAR is comprised of the valves, piping and actuators required to isolate the containment following a Loss of Coolant Accident (LOCA) or steam line rupture. The systems establish and/or maintain isolation of the containment from the outside environment to prevent the release of fission products, and to ensure that the public is protected in accordance with 10 CFR 100 guidelines.

The Containment Isolation System as described in the USFAR is not treated as a system for the purposes of license renewal. Each piping system which penetrates the containment is provided with containment isolation features, which serve to minimize the release of fission products following a Design Basis Accident (DBA). These features are scoped and evaluated in their respective mechanical process systems, rather than the Containment Isolation System as discussed in section 6.2.4 of the UFSAR.

The civil/structural scoping and screening of the Containment Building (2.4.2) evaluates the containment isolation features associated with the structure. The conductor portions (e.g. cables, connections) of electrical penetrations are included in the electrical and I&C scoping and screening described in Section 2.5 of the application.

2.3.2.1 Combustible Gas Control System

System Description

The Combustible Gas Control System consists of subsystems which monitor the combustible gas concentrations in the containment, and which possess the capability for maintaining a mixed containment atmosphere to ensure that hydrogen concentrations remain below flammable levels following a Loss of Coolant Accident (LOCA). This is achieved by monitoring containment hydrogen levels, mixing the containment atmosphere, recombining free hydrogen with oxygen, and/or purging the containment atmosphere.

Hydrogen Monitoring Subsystem

The containment atmosphere is monitored by two completely independent hydrogen sampling and analysis systems which are started after an accident. The suction intakes are located at opposite sides of the containment dome, terminating in 90° elbows pointing downward to minimize entry of spray into the sample lines. To prevent condensation of moisture in the suction lines to the analyzers, the lines from the containment to the monitors are heat traced. This ensures that the gas sample is maintained above the steam saturation temperatures postulated to occur during design basis accidents. The discharge from the monitors is vented back to the containment.

The analyzers are located outside the containment in the Main Steam and Feed Water Pipe Chase Building, and take suction through a heavy-walled tube with lengths varying from 150 feet to 300 feet inside the containment. The hydrogen monitors are normally in a standby mode to preclude a long warm-up time.

Containment Atmosphere Mixing

Mixing of the containment atmosphere to prevent localized buildup of hydrogen concentrations is provided by the Containment Building Spray System (2.3.2.2). The fission products are uniformly distributed in the sump water, being mixed by turbulence caused by injection, break flows and sprays. Virtually all of the hydrogen generated by radiolysis caused by fission products outside the core is released by the water while it is being sprayed.

In addition, atmospheric mixing is achieved by the Containment Air Handling System (2.3.3.5). Following a LOCA, the two fans are started by an engineered safety feature actuation signal. The fans take suction from the apex of the dome and discharge below the operating floor.

Hydrogen Recombiners

One means of combustible gas control in the containment is through the use of electric hydrogen recombiners. Seabrook Station has a pair of recombiners, located at the perimeter of the operating floor inside the containment. The recombiner consists of an inlet preheater section, a heater-recombiner section, and a discharge mixing chamber. The inlet preheater section is a thermally insulated vertical metal duct positioned around a central heater section to take advantage of heat losses from the heater section. The heater section consists of four vertically stacked assemblies of electric heaters, each assembly containing individual heating elements.

Air is first drawn into the preheater section by natural convection, where it is warmed. It then passes through an orifice plate, and enters the electric heater section where it is heated to approximately 1150 to 1400°F, thus causing recombination between the oxygen and hydrogen. An outer enclosure provides protection against containment spray water. The recombiners are manually started after a LOCA.

Backup Purge System

The capability for purging of the containment at a controlled rate is also provided.

Purging is accomplished by venting the containment gas and replacing it with clean compressed air from the plant air system. Compressed air is fed into the containment. The vent flow path consists of piping taking suction high up in the containment, a flow meter, a throttle valve, and associated piping, terminating adjacent to the inlet screens of the containment enclosure exhaust filters located within the containment enclosure. From the filters, there is a direct path to the unit plant vent. All piping inside the containment and the containment penetration connections associated with the purge system are duplicated to provide independent and redundant capability and to prevent a single failure from stopping the containment purge/flow vent. A line supplying service air from the plant air system is provided to the containment for post-accident combustible gas control. However, this line would only be used should both safety-related hydrogen recombiners fail. Containment isolation valves and the associated piping are Safety Class 2, Seismic Category I.

In-Scope Boundary Description

PID-1-CGC-LR20612:

Backup Purge System:

The boundary for the Combustible Gas Control System begins at the service air supply and continues forward through valves and a flow orifice into the containment annulus, through a containment penetration and check valve to the containment atmosphere. The two returning boundary (venting) lines begin at the containment atmosphere, continue through a manual valve, containment isolation valve and exit the containment and annulus and form a common line. The boundary line continues through a flow orifice and on to the containment enclosure, and terminates at the inlet of the containment enclosure exhaust filters.

Hydrogen Recombiner:

Two hydrogen recombiners that are located in containment.

Hydrogen Monitoring:

Two in-boundary hydrogen analyzers located outside the containment draw samples through dedicated sample lines in containment and discharge the sampled gas back to the containment. The sample boundary includes connections to a nearby manual sample panel.

Interfacing Systems

Not included in the Combustible Gas Control System license renewal scoping boundaries is the following interfacing system, which is separately evaluated as a license renewal system:

- Service Air System (included with Instrument Air System)

System Intended Functions

Monitor the concentration of hydrogen gas within the containment building.	10 CFR 54.4(a)(1)
Reduce the combustible gas concentrations within the containment by recombining the free hydrogen with the oxygen in the containment building.	10 CFR 54.4(a)(1)
Provide Containment Isolation function.	10 CFR 54.4(a)(1)
Provide Safe Shutdown Control and indication (PAM)	10 CFR 54.4(a)(1))

This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)

UFSAR References

- Section 6.2.5.1.a
- Section 6.2.5.2
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-CGC-LR20612

Table 2.3.2-1 Combustible Gas Control System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Heat Exchanger Components	Heat Transfer Pressure Boundary
Hydrogen Recombiner	Pressure Boundary
Instrumentation Element	Pressure Boundary Structural Integrity (Attached)
Orifice	Pressure Boundary Throttle
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)
Piping Element	Pressure Boundary
Pump Casing	Pressure Boundary
Tank	Pressure Boundary
Valve Body	Pressure Boundary Structural Integrity (Attached)

The aging management review results for these components are provided in Table 3.2.2-1, Summary of Aging Management Evaluation - Combustible Gas Control System.

2.3.2.2 Containment Building Spray System

System Description

The Containment Building Spray System is designed to remove the energy discharged to the containment following a Loss of Coolant Accident (LOCA) or Main Steam Line Break (MSLB), to prevent the containment pressure from exceeding design pressure and to reduce and maintain containment temperature and pressure within acceptable limits. The Containment Building Spray System provides for iodine removal by mixing sodium hydroxide (NaOH) with borated water from the Refueling Water Storage Tank (RWST) to limit the consequences of a LOCA to within the limits of 10 CFR 100 by providing a rapid reduction in containment elemental iodine concentration. The limits on NaOH volume and concentration ensure a pH value of between 8.5 and 11.0 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

The Containment Building Spray System is composed of two 100% capacity standby system trains. For each train, suction is initially taken from the RWST and pumped through the Containment Building Spray System heat exchanger to the containment building spray headers. NaOH is injected via its hydrostatic head into the mixing chamber of the RWST. As the level in the RWST decreases to its low-low level set point, suction is automatically transferred from the RWST to the containment building recirculation sumps and the system operates in the recirculation mode. There are two penetrations from the containment sump to the Primary Auxiliary Building, with each pipe encased in a sleeve. In each line, immediately inside the Primary Auxiliary Building, is a motor-operated gate valve. After passing through the isolation valve, the flow in each line divides to supply one Containment Building Spray and one Residual Heat Removal pump. Each isolation valve is enclosed within a housing designed to withstand containment design pressure to prevent any leakage to the Primary Auxiliary Building atmosphere. In this mode heat from the hot fluid in the containment building sumps is removed from the Containment Building Spray System and transferred to the Primary Component Cooling Water System. The Primary Component Cooling Water System also provides cooling to the Containment Building Spray pumps.

In-Scope Boundary Description

PID-1-CBS-LR20233, PID-1-RH-LR20662, PID-1-RH-LR20663, PID-1-SI-LR20446, PID-1-SI-LR20447, PID-1-SI-LR20448:

The Containment Building Spray (CBS) System has two independent flow paths from the RWST during the injection phases of operation. Each flow path provides suction flow to the Containment Building Spray pumps, the Safety Injection pumps and the Residual Heat Removal pumps. The Containment Building Spray boundary extends from the RWST to the suction side of the Residual Heat Removal pumps and the Safety Injection pumps. The Containment Building Spray boundary continues though the Containment Building Spray pumps, through the Containment Building Spray heat exchangers, and then through the Containment Building Spray headers, including and ending at the spray header spray nozzles.

The Spray Additive Tank (SAT) provides NaOH via a common line to mix with the borated water in the RWST prior to injection. Both tanks are in hydraulic equilibrium. There is a recirculation pump to provide adequate mixing in the Spray Additive Tank. The Containment Building Spray boundary includes the Spray Additive Tank, its discharge valves and the discharge line to the RWST, recirculation pump, and associated piping and valves. This tank, recirculation pump, discharge isolation valves, and associated piping are within the Containment Building Spray boundary.

Water sprayed in the containment collects in the containment recirculation sumps. When the liquid level in the RWST reaches its low-low level set point, the recirculation sump isolation valves open, providing a suction flow path to the Containment Building Spray pumps and the Residual Heat Removal pumps. The recirculation sump strainers, sump level instrumentation, sump suction isolation valves, and connected piping are in the Containment Building Spray boundary, but recirculation sumps are evaluated with containment structures.

The Containment Building Spray has a line from the Containment Building Spray heat exchanger outlet lines back to the RWST, which is used to test the Containment Building Spray pumps. The Containment Building Spray test line from the pump discharge to the RWST is in the Containment Building Spray boundary.

Piping and valves associated with instrumentation measuring level and temperature at the RWST and Spray Additive Tank are in the Containment Building Spray boundary. The Containment Building Spray is automatically initiated by containment pressure sensors. These sensors and associated pipes and valves are within the boundary of the Safety Injection System.

PID-1-CS-LR20725:

Two suction lines that supply borated water during the injection phase of operation to the suction side of the charging pumps are in the Containment Building Spray boundary.

PID-1-SF-LR20482:

The RWST supplies makeup to the Spent Fuel Pool Cooling (SF) System and this line from RWST isolation valve to the Spent Fuel Pool Cooling isolation valve is in the Containment Building Spray boundary.

PID-1-WLD-LR20219, PID-1-WLD-LR20221:

Relief valves in the tube side of the Containment Building Spray System heat exchangers discharge to the Waste Processing Liquid Drains System in the Residual Heat Removal equipment vaults. These relief valves are in the Containment Building Spray boundary. The drain lines from these relief valves are within the Containment Building Spray boundary. Drain lines from the Containment Building Spray piping inside of containment (drains spray header) to the containment trench are within the Containment Building Spray boundary.

PID-1-AS-LR20571, PID-1-ASC-LR20907:

The steam heaters for the Refueling Water Storage Tank and Spray Additive Tank are within the Containment Building Spray boundary.

Interfacing Systems

Not included in the Containment Building Spray System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam System
- Auxiliary Steam Condensate System
- Chemical and Volume Control System
- Primary Component Cooling Water System
- Residual Heat Removal System
- Safety Injection System

System Intended Functions

Provides long term decay heat removal following a Loss Of Coolant Accident (LOCA) or Main Steam Line Break (MSLB) by providing a flow path from containment to the Residual Heat Removal pumps.	10C FR 54.4(a)(1)
Limit containment peak pressure and temperature below design basis limits following a Loss Of Coolant Accident (LOCA) or Main Steam Line Break (MSLB).	10 CFR 54.4(a)(1)
Reduce containment atmospheric Iodine concentration following a Loss Of Coolant Accident (LOCA).	10 CFR 54.4(a)(1)
Containment Building Spray sump isolation valve encapsulation vessels provide backup containment integrity for penetrations without inside reactor containment isolation.	10 CFR 54.4(a)(1)
Mixes the containment atmosphere to prevent localized buildup of hydrogen concentration.	10 CFR 54.4(a)(1)
Provide design basis Engineered Safety Features Actuation Signals (ESFAS).	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide Containment Isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)

UFSAR References

- Section 6.2
- Section 6.3
- Section 6.5
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-AS-LR20571
- PID-1-ASC-LR20907
- PID-1-CBS-LR20233
- PID-1-CS-LR20725
- PID-1-RH-LR20662
- PID-1-RH-LR20663
- PID-1-SF-LR20482
- PID-1-SI-LR20446
- PID-1-SI-LR20447
- PID-1-SI-LR20448
- PID-1-WLD-LR20219
- PID-1-WLD-LR20221

Table 2.3.2-2 Containment Building Spray System
Components Subject to Aging Management Review

Component Type	Intended Functions
Bolting	Pressure Boundary
Expansion Joint	Pressure Boundary
Filter Housing	Leakage Boundary (Spatial)
Flexible Hose	Leakage Boundary (Spatial)
Heat Exchanger Components	Heat Transfer Pressure Boundary
Heater Housing	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Nozzle	Spray
Orifice	Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Pump Casing	Pressure Boundary Leakage Boundary (Spatial)
Screen	Filter
Tank	Pressure Boundary Leakage Boundary (Spatial)
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.2.2-2, Summary of Aging Management Evaluation - Containment Building Spray System.

2.3.2.3 Residual Heat Removal System

System Description

The Residual Heat Removal System transfers heat from the Reactor Coolant System to the Primary Component Cooling Water System to reduce the temperature of the Reactor Coolant System to the cold shutdown temperature, at a controlled rate, during the second part of the normal plant cool down, and maintain this temperature until the plant is started up again.

The Residual Heat Removal System is provided with two Residual Heat Removal pumps and two Residual Heat Removal heat exchangers arranged in two separate and independent flow paths.

The Residual Heat Removal System also makes up the low-head injection portion of the Emergency Core Cooling System (ECCS) by injecting borated water from the Refueling Water Storage Tank (RWST) into the Reactor Coolant System cold legs during the injection phase following a Loss of Coolant Accident (LOCA). In its capacity as the low head portion of the ECCS, the Residual Heat Removal System provides long-term recirculation capability for core cooling following the injection phase of a LOCA. The changeover from the injection mode to the recirculation mode is initiated automatically upon low-low level in the RWST. This function is accomplished by aligning the Residual Heat Removal System to take fluid from the containment sump, cool it in the Residual Heat Removal heat exchangers, and supply it to the core directly as well as via the high-head Chemical and Volume Control System centrifugal charging pumps and intermediate-head Safety Injection System pumps.

The Residual Heat Removal System also is used to transfer refueling water between the refueling cavity and the RWST at the beginning and end of the refueling operations.

In-Scope Boundary Description

PID-1-CBS-LR20233, PID-1-CS-LR20722, PID-1-CS-LR20725, PID-1-RC-LR20841, PID-1-RC-LR20844, PID-1-RH-LR20662, PID-1-RH-LR20663, PID-1-SI-LR20446, PID-1-SI-LR20447, PID-1-SI-LR20448, PID-1-SI-LR20449, PID-1-SI-LR20450:

The Residual Heat Removal (RH) System license renewal boundary begins at the pump suction of the Residual Heat Removal pumps, proceeds through a flow element and on to a piping tee where flow can be bypassed around the Residual Heat Removal heat exchanger via a flow control valve, and on to terminate at the Safety Injection accumulator injection paths. The flow that passes through the heat exchanger can merge with the bypass flow and on to the Reactor Coolant System cold legs. There are three additional lines connected to the heat exchanger outlet. One line recirculates Residual Heat Removal pump flow to accommodate low flow situations; the second line provides suction flow to the Safety Injection pumps via the Containment Building Spray System when the ECCS is in the recirculation mode; and the third line from each heat exchanger joins to a common line with an air operated valve before terminating at the inlet to the letdown heat exchanger in the Chemical and Volume Control System. All the above mentioned pumps, piping, valves, flow elements, and heat exchangers involved in developing Residual Heat Removal System flow to the Safety Injection accumulator injection lines are within the Residual Heat Removal System boundary. In the recirculation phase, cross connects between the two trains enable the Residual Heat Removal System to inject into the hot legs. The cross-connect piping, valves, flow elements, and piping leading to the Reactor Coolant System are within the Residual Heat Removal System boundary. The valve and piping connecting the cross connect line to the RWST are within the Residual Heat Removal System boundary.

Piping down stream of the test isolation valves forming a class break, all capped drain and test line drains, and drains from relief valves are within the Residual Heat Removal System boundary. The Residual Heat Removal pump seal water vent sight glasses and lines from the Residual Heat Removal pumps down stream of the class break isolation valves are also within the Residual Heat Removal System boundary.

PID-1-VSL-LR20776, PID-1-WLD-LR20221:

The Residual Heat Removal pump seal water vent sight glasses lines and the valve stem leak off lines for Residual Heat Removal valves drain to the Waste Processing Liquid Drains System and are within the Residual Heat Removal System boundary.

Interfacing Systems

Not included in the Residual Heat Removal System scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:

- Chemical and Volume Control System
- Containment Building Spray System
- Reactor Coolant System
- Safety Injection System
- Sample System

- Valve Stem Leak-Off System
- Waste Processing Liquid Drains System

System Intended Functions

Provide Reactor Coolant System cold leg injection from the Refueling Water Storage Tank (RWST) when the Reactor Coolant System pressure has decreased below shutoff head for low head ECCS injection.	10 CFR54.4 (a)(1)
Transfer and cool water from the containment sumps and inject water back into the Reactor Coolant System cold legs or hot legs during long term recirculation.	10 CFR 54.4(a)(1)
Provide Reactor Coolant System decay heat removal during emergency plant cool down.	10 CFR 54.4(a)(1)
Provide Reactor Coolant System reduced inventory cooling.	10 CFR 54.4(a)(1)
Provide overpressure protection and isolation from the Reactor Coolant System.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide Containment Isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 5.4.7

- Section 6.3
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-CBS-LR20233
- PID-1-CS-LR20722
- PID-1-CS-LR20725
- PID-1-RC-LR20841
- PID-1-RC-LR20844
- PID-1-RH-LR20662
- PID-1-RH-LR20663
- PID-1-SI-LR20446
- PID-1-SI-LR20447
- PID-1-SI-LR20448
- PID-1-SI-LR20449
- PID-1-SI-LR20450
- PID-1-VSL-LR20776
- PID-1-WLD-LR20221

Table 2.3.2-3 Residual Heat Removal System

Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Bolting (Class 1)	Pressure Boundary
Flexible Hose	Leakage Boundary (Spatial)
Heat Exchanger Components	Heat Transfer Pressure Boundary
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping and Fittings (Class 1)	Pressure Boundary
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle
Piping Element	Leakage Boundary (Spatial) Pressure Boundary
Pump Casing	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary
Valve Body (Class 1)	Pressure Boundary

The aging management review results for these components are provided in Table 3.2.2-3, Summary of Aging Management Evaluation - Residual Heat Removal System.

2.3.2.4 Safety Injection System

System Description

The Safety Injection System makes up the intermediate head injection portion of the Emergency Core Cooling System (ECCS). The intermediate head injection function is performed by two redundant Safety Injection pumps. The Safety Injection pumps take suction from the Refueling Water Storage Tank (RWST) and inject to the Reactor Coolant System cold legs when Reactor Coolant System pressure is reduced below the Safety Injection pump shutoff head. A minimum flow bypass line is provided on each pump discharge to recirculate flow to the RWST in the event that the pumps are started with Reactor Coolant System pressure above the pump shutoff head. A series of valves in this line provide isolation. These valves are manually closed from the control room as a part of the ECCS realignment from injection to the recirculation mode. The Safety Injection accumulators inject borated water into the Reactor Coolant System cold legs when reactor pressure drops below the pressure in the Safety Injection accumulator tanks. Swing disc check valves in the injection path open to allow flow from the accumulators to the core via the cold leg.

When the RWST level reaches the low-low level, the suction valves from the containment sumps to the Containment Building Spray and Residual Heat Removal System lines open and the Containment Building Spray System and Residual Heat Removal System continue to operate in the recirculation mode. In the containment sump recirculation mode, the Safety Injection pumps and the Chemical and Volume Control System centrifugal charging pumps are manually realigned and take suction from the Residual Heat Removal pumps.

The accumulator tanks are used to inject a sufficient volume of water into the Reactor Coolant System cold legs to refill the reactor-vessel/core-barrel annulus and the lower reactor vessel plenum (up to the bottom of the core) following a major Loss of Coolant Accident (LOCA). This permits the other ECCS subsystems to quickly supply cooling water to the reactor core.

The accumulator tanks are partially filled with primary grade, borated water and are pressurized with nitrogen gas. One accumulator tank is connected to each Reactor Coolant System cold leg. The accumulators are located inside containment.

If the accumulators require makeup water, it is supplied from the RWST via the Safety Injection pumps. The accumulators are pressurized from the Nitrogen Gas System. The Nitrogen Gas System is discussed in Section 2.3.3.24.

When Reactor Coolant System pressure drops below the accumulator gas pressure, the accumulator contents are injected into the Reactor Coolant System. During normal operations, check valves prevent normal Reactor Coolant System pressure from leaking back into the accumulator. To minimize the number of penetrations into the Reactor Coolant System, the Safety Injection pump discharge lines connect to the discharge lines of the Residual Heat Removal pumps, which then joins the accumulator injection line. Once the accumulator contents have been injected into the Reactor Coolant System, the accumulators serve no further purpose.

In-Scope Boundary Description

High Head Injection
PID-1-SI-LR20447:

The ECCS high head injection flow is provided by the centrifugal charging pumps which discharge through the high head injection valves which are in parallel and continue on to the Reactor Coolant System cold legs. The centrifugal charging pumps are evaluated with the Chemical and Volume and Control system (discussed in section 2.3.3.3)

Intermediate Head Injection
PID-1-SI-LR20446, PID-1-SI-LR20447, PID-1-SI-LR20449, PID-1-CBS-LR20233, PID-1-RC-LR20841, PID-1-RC-LR20842, PID-1-RC-LR20843, PID-1-RC-LR20844, PID-1-RH-LR20662, PID-1-RH-LR20663:

The ECCS intermediate head injection begins at the suction of the Safety Injection pumps and discharges to either the common cross-connect piping between Safety Injection pumps and on to the accumulators discharge piping to the Reactor Coolant System cold legs or directly to the Reactor Coolant System hot legs. Each Safety Injection line to the Reactor Coolant System has two series check valves to prevent over pressurization of the upstream piping. These components are within the Safety Injection boundary. There is a minimum flow recirculation line with an isolation valve from each Safety Injection pump discharge. These two lines join to a common return line to the RWST. The common line contains an isolation valve forming the class break. These two separate lines with isolation valves and the common return with isolation valve are in scope. The piping, valves and flow element down stream of the common line isolation valve are in scope. Capped drain lines and drain lines from the Safety Injection relief valves are in scope. Test lines from the hot leg injection lines are in the Safety Injection boundary. In the containment sump recirculation mode, Safety Injection pumps take suction from the discharge of the Residual Heat Removal heat exchangers. The in scope boundary in the recirculation mode is the same as is in the injection mode.

Accumulator Injection
PID-1-SI-LR20450, PID-1-WLD-LR20218:

The Safety Injection accumulator injection starts with flow discharged from the accumulator tank through a check valve, through a normally open motor operated valve and discharges to the Reactor Coolant System cold leg piping. The accumulators, discharge lines, valves in the discharge lines, accumulator instrument piping, fill line between the accumulator and fail-closed class break isolation, and the test line between the accumulator and fail-closed class break isolation valve are within the Safety Injection System boundary. The nitrogen vent lines and valves are within the Safety Injection System boundary. The containment isolation valves and piping are within the Safety Injection System boundary.

All lines connected between the inboard containment isolation valve and fail-closed class break valves in the test lines, and the fill and drain lines, are within the Safety Injection System boundary. Valves, piping and flow elements down stream of the outboard containment isolation valve are within the Safety Injection System boundary. The accumulator drain lines are in scope up to the isolation valve.

The piping down stream of the drain line isolation valves is within the Safety Injection System boundary. The capped drains and relief valve discharge lines are within the Safety Injection boundary. The Nitrogen Gas line to each accumulator is isolated during normal operations, and these lines are evaluated with the Nitrogen Gas System (discussed in Section 2.3.3.24).

PID-1-WLD-LR20219, PID-1-WLD-LR20221:

The Waste Processing Liquid Drain System drawings show the in scope system interface for drains in the Safety Injection System.

PID-1-BRS-LR20854:

The Boron Recovery System drawing shows the in scope system interface with the test header for the Safety Injection System.

Interfacing Systems

Not included in the Safety Injection System scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:

- Chemical and Volume Control System
- Containment Building Spray System
- Nitrogen Gas System
- Reactor Coolant System

- Residual Heat Removal System
- Sample System
- Valve Stem Leak-Off System
- Waste Processing Liquid Drains System

System Intended Functions

Injects borated water into the Reactor Coolant System when Reactor Coolant System pressure has decreased below shutoff head for intermediate head ECCS injection.	10 CFR 54.4(a)(1)
Provide a sufficient volume of water for injection into the Reactor Coolant System cold legs to refill the reactor vessel/core barrel annulus and vessel plenum following a loss of coolant accident.	10 CFR 54.4(a)(1)
Provide emergency core cooling during ECCS recirculation for either Reactor Coolant System cold leg or hot leg recirculation.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Isolate the accumulators from the Reactor Coolant System.	10 CFR 54.4(a)(1)
Provide design basis Engineered Safety Features Actuation Signals (ESFAS).	10 CFR 54.4(a)(1)
Provide Containment Isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited in the current licensing basis for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited in the current licensing basis for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Tech Spec 3.5.1.1
- Section 6.3
- Table 6.2-83
- Table 7.3-1
- Table 7.5-1

License Renewal Drawings

- PID-1-BRS-LR20854
- PID-1-CBS-LR20233
- PID-1-RC-LR20841
- PID-1-RC-LR20842
- PID-1-RC-LR20843
- PID-1-RC-LR20844
- PID-1-RH-LR20662
- PID-1-RH-LR20663
- PID-1-SI-LR20446
- PID-1-SI-LR20447
- PID-1-SI-LR20449
- PID-1-SI-LR20450
- PID-1-WLD-LR20218
- PID-1-WLD-LR20219
- PID-1-WLD-LR20221

Table 2.3.2-4 Safety Injection System

Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Bolting (Class 1)	Pressure Boundary
Filter Element	Filter
Filter Housing	Pressure Boundary
Heat Exchanger Components	Heat Transfer Pressure Boundary
Instrumentation Element	Pressure Boundary
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle
Orifice (Class 1)	Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping and Fittings (Class 1)	Pressure Boundary
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle
Piping Element	Pressure Boundary
Pump Casing	Pressure Boundary
Tank	Pressure Boundary
Thermowell	Leakage Boundary (Spatial) Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary
Valve Body (Class 1)	Pressure Boundary

The aging management review results for these components are provided in Table 3.2.2-4, Summary of Aging Management Evaluation - Safety Injection System.

2.3.3 AUXILIARY SYSTEMS

The following systems are addressed in this section:

- Auxiliary Boiler (2.3.3.1)
- Boron Recovery System (2.3.3.2)
- Chemical and Volume Control System (2.3.3.3)
- Chlorination System (2.3.3.4)
- Containment Air Handling System (2.3.3.5)
- Containment Air Purge System (2.3.3.6)
- Containment Enclosure Air Handling System (2.3.3.7)
- Containment Online Purge System (2.3.3.8)
- Control Building Air Handling System (2.3.3.9)
- Demineralized Water System (2.3.3.10)
- Dewatering System (2.3.3.11)
- Diesel Generator (2.3.3.12)
- Diesel Generator Air Handling System (2.3.3.13)
- Emergency Feed Water Pump House Air Handling System (2.3.3.14)
- Fire Protection System (2.3.3.15)
- Fuel Handling System (2.3.3.16)
- Fuel Oil System (2.3.3.17)
- Fuel Storage Building Air Handling System (2.3.3.18)
- Hot Water Heating System (2.3.3.19)
- Instrument Air System (2.3.3.20)
- Leak Detection System (2.3.3.21)

- Mechanical Seal Supply System (2.3.3.22)
- Miscellaneous Equipment (2.3.3.23)
- Nitrogen Gas System (2.3.3.24)
- Oil Collection for Reactor Coolant Pumps System (2.3.3.25)
- Plant Floor Drain System (2.3.3.26)
- Potable Water System (2.3.3.27)
- Primary Auxiliary Building Air Handling System (2.3.3.28)
- Primary Component Cooling Water System (2.3.3.29)
- Radiation Monitoring System (2.3.3.30)
- Reactor Makeup Water System (2.3.3.31)
- Release Recovery System (2.3.3.32)
- Resin Sluicing System (2.3.3.33)
- Roof Drains System (2.3.3.34)
- Sample System (2.3.3.35)
- Screen Wash System (2.3.3.36)
- Service Water System (2.3.3.37)
- Service Water Pump House Air Handling System (2.3.3.38)
- Spent Fuel Pool Cooling System (2.3.3.39)
- Switchyard (2.3.3.40)
- Valve Stem Leak-off System (2.3.3.41)
- Vent Gas System (2.3.3.42)
- Waste Gas System (2.3.3.43)
- Waste Processing Liquid System (2.3.3.44)
- Waste Processing Liquid Drains System (2.3.3.45)

2.3.3.1 Auxiliary Boiler System

System Description

This is a subsystem of the Auxiliary Steam System. The Auxiliary Boiler System provides steam to the Auxiliary Steam System, which in turn provides process steam for various plant heating loads.

There are two main purposes of the Auxiliary Boiler System. The first is to provide steam to the Auxiliary Steam System. The second is to provide fuel oil to the Fire Pump House Boiler. The Fire Pump House Boiler provides steam to heat the Fire Water Storage Tank and provides steam to the Fire Pump House unit heaters.

The Auxiliary Boiler System consists of two package boilers, which include a de-aerating heater with storage tank, boiler feed pumps, fuel oil pumps, and a blowdown tank. Also included are the fuel oil storage tank and the associated piping. The portion of the Auxiliary Boiler System that supplies oil to the Fire Pump House Boiler consists of piping from the fuel oil storage tank to the Fire Pump House Boiler and the Fire Pump House Boiler oil pumps.

In-Scope Boundary Description

The license renewal boundary of the Auxiliary Boiler (AB) System required for Fire Protection is the fuel oil system pressure boundary path for supplying fuel oil to boiler 1-ASH-E-218.

Auxiliary Boiler Fuel Tank
PID-1-AB-LR20016:

The Auxiliary Boiler System boundary begins with the Auxiliary Boiler fuel oil storage tank and includes the fuel oil truck fill connection. From the dike containing the fuel tank, underground lines lead to and from the fuel oil pumps in the auxiliary boiler room of the administration building, and the fire pump house boiler building.

Auxiliary Boiler Fuel Supply
PID-1-AB-LR20014:

The boundary piping to the auxiliary boiler fuel pump set includes a suction strainer, the three fuel oil pumps, a pressure controlled recirculation valve and the supply lines to and from each boiler control set for the atomizing stations. The boundary includes the lines up to the pressure control valve and the fuel oil storage tank return line**.** The boundary ends at the fuel oil shut off valve for the main and auxiliary atomizers.

Fire Pump House
PID-1-ASC-LR20912

The boundary piping for the fire pump house boiler includes a suction strainer, pressure control valve, burner driven fuel oil pump and fuel flow control valves and piping. The boundary also includes the blower air damper and return line to the fuel oil storage tank.

Interfacing Systems

Not included in the Auxiliary Boiler System license renewal scoping boundaries are the following interfacing system, which is separately evaluated as a license renewal system.

- Auxiliary Steam Heating System

System Intended Functions

This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 10.4.11

License Renewal Drawings

- PID-1-AB-LR20014
- PID-1-AB-LR20016
- PID-1-ASC-LR20912

Table 2.3.3-1 Auxiliary Boiler System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Damper Housing	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Pressure Boundary
Flame Arrestor	Pressure Boundary
Instrumentation Element	Pressure Boundary
Piping and Fittings	Pressure Boundary
Pump Casing	Pressure Boundary
Tank	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-1, Summary of Aging Management Evaluation - Auxiliary Boiler.

2.3.3.2 Boron Recovery System

System Description

The Boron Recovery System stores and processes reactor coolant effluent and reactor coolant grade drainage for reuse in the plant or for disposal offsite. The system maximizes recycling of effluent back to the plant and minimizes the release of radioactive material to the environment by proper cleanup and volume reduction methods. The system process is a combination of degasification, demineralization, filtration and evaporation. The Boron Recovery System is designed as non-nuclear safety class and non-seismic Category I.

The Boron Recovery System is designed to:

- Process the reactor coolant letdown liquid generated by normal operations under either base loaded or load-following conditions.
- Permit startup from a cold shutdown condition. For conservatism, the plant is assumed to be in end-of-core-life conditions (50 ppm boron concentration), and evaporator availability is considered to be 75 percent of the time.
- Produce distillate from the boron evaporator with a maximum of 5 ppm boron, and provide by means of the boron demineralizers (mixed bed ion exchange units) the capability for reducing the boron concentration further, if so desired.
- Provide radioactivity decontamination and chemical purification such that: (1) for reuse within the station, the system effluent meets the chemical purity requirements for recycled reactor makeup water, and (2) for discharge from the station, the effluent meets required radioactivity release limitations.
- Accept and process any hydrogenated liquid drains collected in the primary drain tank.

Other sources of liquid which can be transferred into the Recovery Test Tanks (1-BRS-TK-58-A and B) include effluent from a skid-mounted waste liquid processing system should additional storage capacity be required prior to discharge.

In-Scope Boundary Description

PID-1-BRS-LR20861, PID-1-ASC-LR20902:

The license renewal boundary begins when the Boron Recovery System Recovery Test Tank inlet lines leave the Waste Process Building and enter the

Tank Farm building. The Boron Recovery System Recovery Test Tanks, tank panel heaters, and connected instruments are included. Tank outlet lines, drain valves, and isolation valves are included until the line ends or leaves the Tank Farm and enters the Waste Process Building.

PID-1-CS-LR20724, PID-1-VSL-LR20775:

Included in the license renewal boundary is the Primary Drain Tank Transfer Pumps to Letdown Degasifier line and isolation valve as it enters the Primary Auxiliary Building from the Waste Process Building. Also included in this boundary is the valve stem leak-off for the isolation valve.

Interfacing Systems

Not included in the Boron Recovery System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam System
- Auxiliary Steam Condensate System
- Chemical and Volume Control System
- Reactor Makeup Water System

System Intended Functions

This system contains components which perform functions credited for Non Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Section 9.3.5

License Renewal Drawings

- PID-1-ASC-LR20902
- PID-1-BRS-LR20861
- PID-1-CS-LR20724
- PID-1-VSL-LR20775

Table 2.3.3-2 Boron Recovery System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Flexible Hose	Leakage Boundary (Spatial)
Heater Housing	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The age management review results for these components are provided in Table 3.3.2-2, Summary of Age Management Evaluations - Boron Recovery System.

2.3.3.3 Chemical and Volume Control System

System Description

The Chemical and Volume Control System is designed to:

- Provide emergency core cooling. A portion of the Chemical and Volume Control System is used to supply high-head injection as part of the Emergency Core Cooling System (ECCS).
- Regulate the concentration of chemical neutron absorber (boron) in the reactor coolant to control reactivity changes resulting from the change in reactor coolant temperature between cold shutdown and hot full power operation, burn up of fuel and burnable poisons, buildup of fission products in the fuel, and xenon transients.
- Maintain the coolant inventory in the Reactor Coolant System within the allowable pressurizer level range for all normal modes of operation including startup from cold shutdown, full power operation and plant cooldown.
- Remove fission and activation products, in ionic form, in gaseous form or as particulates, from the reactor coolant during operation and to reduce activity releases due to leaks.
- Add chemicals to the Reactor Coolant System to control the pH of the coolant during initial startup and subsequent operation, scavenge oxygen from the coolant during startup, and counteract the production of oxygen in the reactor coolant due to radiolysis of water in the core region.
- Supply filtered water to each reactor coolant pump seal, as required by the reactor coolant pump design.
- Supply water at the maximum test pressure specified for hydrostatic testing of the Reactor Coolant System.

The Chemical and Volume Control System consists of several subsystems:

- High-head injection part of the emergency core cooling
- The Charging, Letdown and Seal Water System
- The Reactor Coolant Purification and Chemistry Control System
- The Reactor Makeup Control System

- The Boron Thermal Regeneration System

High Head Injection System:

The high-head injection part of the Emergency Core Cooling System consists of the Chemical and Volume Control System centrifugal charging pumps, Reactor Coolant System injection header isolation valves, and injection lines to the four Reactor Coolant System cold legs. This system is used to inject borated makeup water from the Refueling Water Storage Tank (RWST) into the Reactor Coolant System cold legs.

The high head injection system is capable of injecting cool, primary grade, borated water into the Reactor Coolant System at or above normal Reactor Coolant System pressure, as would be necessary in the event of a small break loss of coolant accident.

During normal plant operation, the high head injection flow path is isolated from both the RWST and Reactor Coolant System. During a safety injection, however, the injection header from the Chemical and Volume Control System to the Reactor Coolant System is un-isolated and the Centrifugal Charging Pumps pump water from the RWST into the four Reactor Coolant System cold legs. The flow path for the high-head injection system is the same for all phases of emergency core cooling. When the RWST level reaches the low-low level, the suction valves from the containment sumps to the Containment Building Spray and Residual Heat Removal System lines open and the Containment Building Spray System and Residual Heat Removal System continue to operate in the recirculation mode. In the containment sump recirculation mode, the Safety Injection pumps and the Chemical and Volume Control System Centrifugal Charging Pumps are manually realigned and take suction from the Residual Heat Removal pumps.

The Charging, Letdown and Seal Water System:

The charging and letdown functions of the Chemical and Volume Control System are employed to maintain a programmed water level in the Reactor Coolant System pressurizer, thus maintaining proper reactor coolant inventory during all phases of plant operation. This is achieved by means of a continuous feed and bleed process during which the feed rate is automatically controlled based on pressurizer water level.

Two high-pressure letdown valves are provided in parallel, either of which can be utilized to adjust letdown flow from 0 to 80 gpm. Reactor coolant is discharged to the Chemical and Volume Control System from a reactor coolant loop cold leg; it then flows through the shell side of the regenerative heat exchanger where its temperature is reduced by heat transfer to the charging flow passing through the tubes. The coolant then experiences a large pressure reduction as it passes through the high pressure letdown control valve.

Three charging pumps (one positive displacement and two centrifugal) are provided to take suction from the volume control tank and return the purified reactor coolant to the Reactor Coolant System. Normal charging flow is handled by one of the three charging pumps. This charging flow splits into two paths. The bulk of the charging flow is pumped back to the Reactor Coolant System cold leg through the tube side of the regenerative heat exchanger. The letdown flow in the shell side of the regenerative heat exchanger raises the charging flow to a temperature approaching the reactor coolant temperature. Two redundant charging paths are provided from a point downstream of the regenerative heat exchanger. The centrifugal charging pumps also serve as high-head safety injection pumps in the Emergency Core Cooling System.

A portion of the charging flow is directed to the Reactor Coolant pumps (nominally 8 gpm per pump) through a seal water injection filter. The flow is directed to a point above the pump shaft bearing. Here the flow splits and a portion (nominally 5 gpm per pump) enters the Reactor Coolant System through the labyrinth seals and thermal barrier.

The excess letdown path is provided as an alternate letdown path from the Reactor Coolant System in the event that the normal letdown path is inoperable. Reactor coolant can be discharged from a cold leg to flow through the tube side of the excess letdown heat exchanger, where it is cooled by primary component cooling water.

The Reactor Coolant Purification and Chemistry Control System:

The reactor coolant Purification and Chemistry Control System maintains reactor coolant chemistry within EPRI specified guidelines.

pH Control:

The pH control chemical employed is lithium hydroxide. The concentration of lithium-7 in the Reactor Coolant System is maintained in the range specified for pH control per approved station procedures and EPRI PWR Primary Water Chemistry Guidelines. If the concentration exceeds this range, the cation bed demineralizer is employed in the letdown line in series operation with one or both of the mixed bed demineralizers. Since the amount of lithium to be removed is small, and its buildup can be readily calculated, the flow through the cation bed demineralizer is not required to be full letdown flow. If the concentration of lithium-7 is below the specified limits, lithium hydroxide can be introduced into the Reactor Coolant System via the charging flow. The solution is prepared and poured into the chemical mixing tank. Reactor makeup water is then used to flush the solution to the suction manifold of the charging pumps.

Oxygen Control:

During reactor startup from the cold condition, hydrazine is employed as an oxygen scavenging agent. The hydrazine solution is introduced into the Reactor Coolant System in the same manner as described above for the pH control agent. Hydrazine is not employed at any time other than startup from the cold shutdown state. Dissolved hydrogen is employed to control and scavenge oxygen produced due to radiolysis of water in the core region. A sufficient partial pressure of hydrogen is maintained in the volume control tank so that the specified equilibrium concentration of hydrogen is maintained in the reactor coolant. A pressure control valve maintains a minimum pressure in the vapor space of the volume control tank. This valve can be adjusted to provide the correct equilibrium hydrogen concentration. Hydrogen is supplied from the hydrogen manifold in the Gaseous Waste Processing System. When the letdown flow is degasified, hydrogen is injected into the degasified coolant before it is discharged into the volume control tank.

Reactor Coolant Purification:

Mixed bed demineralizers and a degasifier package are provided in the letdown line to provide cleanup of the letdown flow. The demineralizers remove ionic corrosion products and certain fission products. One demineralizer is in continuous service, with the second mixed bed demineralizer serving as a standby unit for use if the operating demineralizer becomes exhausted during operation or both demineralizers are in service operating in parallel. A further cleanup feature is provided for use during cold shutdown and residual heat removal. A remote-operated valve admits a bypass flow from the Residual Heat Removal System (RH) into the letdown line upstream of the letdown heat exchanger. The flow passes through the heat exchanger, though the demineralizer pre-filter, through a mixed bed demineralizer and the reactor coolant filter to either the volume control tank and to the Reactor Coolant System via the normal charging route, or directly to the operating Residual Heat Removal pump suction line. Filters are provided at various locations to ensure filtration of particulate and resin fines, and to protect the seals on the reactor coolant pumps. Fission gases are normally removed from the reactor coolant by the letdown degasifier, or they may be removed by continuous purging of the volume control tank to the Gaseous Waste Processing System.

The Reactor Makeup Control System:

The soluble neutron absorber (boric acid) concentration is controlled by the Reactor Makeup Control System. It can also be controlled by the Boron Thermal Regeneration System. The Reactor Makeup Control System is also used to maintain proper reactor coolant inventory. In addition, for emergency boration and makeup, the capability exists to provide refueling water or 4-weight percent boric acid directly to the suction of the charging pump.

The Reactor Makeup Control System provides a manually pre-selected makeup composition to the charging pump suction header or to the volume control tank. The makeup control functions are those of maintaining desired operating fluid inventory in the volume control tank and adjusting reactor coolant boron concentration for reactivity control. Reactor makeup water and boric acid solution are blended together at the reactor coolant boron concentration for use as makeup to maintain volume control tank inventory, or they can be used separately to change the reactor coolant boron concentration.

The boric acid is stored in two boric acid tanks. Two boric acid transfer pumps are provided, with one pump normally aligned to provide boric acid to the suction header of the charging pumps, and the second pump in reserve. On a demand signal by the reactor makeup controller, the pump starts and delivers boric acid to the suction header of the charging pumps. The pump is also used to recirculate the boric acid tank fluid.

All portions of the Chemical and Volume Control System which normally contain concentrated boric acid solution are required to be located within a heated area in order to maintain solution temperature at ≥ 65°F. If a portion of the system which normally contains concentrated boric acid solution is not located in a heated area, it is provided with some other means (e.g., heat tracing) to maintain solution temperature at ≥ 65°F.

The reactor makeup water pumps, taking suction from the reactor makeup water storage tank, are employed for various makeup and flushing operations throughout the systems. One of these pumps starts on demand from the reactor makeup controller and provides flow to the suction header of the charging pumps or the volume control tank through the letdown line and spray nozzle.

The Boron Thermal Regeneration System:

Downstream of the mixed bed demineralizers, if load following operation were desired, the letdown flow can be diverted to the Boron Thermal Regeneration System where part or all of the letdown flow can be treated for boron concentration changes. After processing, the flow is returned to a point upstream of the reactor coolant filter.

Storage and release of boron if load follow operation is conducted, would be determined by the temperature of fluid entering the thermal regeneration demineralizers. A chiller unit and a group of heat exchangers would be employed to provide the desired fluid temperatures at the demineralizer inlets for either storage or release operation of the system

The flow path through the Boron Thermal Regeneration System is different for the boron storage and the boron release operations. During boron storage, the letdown stream enters the moderating heat exchanger and from there it passes through the letdown chiller heat exchanger. These two heat exchangers cool the letdown stream prior to its entering the demineralizers. The letdown reheat heat exchanger is valved out on the tube side and performs no function during boron storage operations. The temperature of the letdown stream at the point of entry to the demineralizers is controlled automatically by the temperature control valve which controls the shell side flow to the letdown chiller heat exchanger. After passing through the demineralizers, the letdown enters the moderating heat exchanger shell side, where it is heated by the incoming letdown stream before going to the volume control tank.

Therefore, for boron storage, a decrease in the boric acid concentration in the reactor coolant is accomplished by sending the letdown flow at relatively low temperatures to the thermal regeneration demineralizers. The resin, which was depleted of boron at high temperature during a prior boron release operation, is now capable of storing boron from the low temperature letdown stream. Reactor coolant with a decreased concentration of boric acid leaves the demineralizers and is directed to the Reactor Coolant System via the charging system.

During the boron release operation, the letdown stream enters the moderating heat exchanger tube side, bypasses the letdown chiller heat exchanger, and passes through the shell side of the letdown reheat heat exchanger. The moderating and letdown reheat heat exchangers heat the letdown stream prior to its entering the resin beds. The temperature of the letdown at the point of entry to the demineralizers is controlled automatically by the temperature control valve which controls the flow rate on the tube side of the letdown reheat heat exchanger. After passing through the demineralizers, the letdown stream enters the shell side of the moderating heat exchanger, passes through the tube side of the letdown chiller heat exchanger and then goes to the volume control tank. The temperature of the letdown stream entering the volume control tank is controlled automatically by adjusting the shell side flow rate on the letdown chiller heat exchanger. Thus, for boron release, an increase in the boric acid concentration in the reactor coolant is accomplished by sending the letdown flow at relatively high temperatures to the thermal regeneration demineralizers. The water flowing through the demineralizers now results in boron being released which was stored by the resin at low temperature during a previous boron storage operation. The boron-enriched reactor coolant is returned to the Reactor Coolant System via the charging system. For either of the above operating modes, the flow through the demineralizers can be adjusted from zero flow to the total letdown flow. Reduced flow through the demineralizers is achieved by adjusting the three-way valve located upstream of the demineralizers to split the flow so that a portion of the flow bypasses the demineralizers.

Although the Boron Thermal Regeneration System was initially primarily designed to compensate for xenon transients occurring during load follow, it can also be used to handle boron changes during other modes of plant operation. During startup dilution, for example, the resin beds would be first saturated, then washed off to the primary drain tank, then again saturated and washed off. This operation would continue until the desired dilution in the Reactor Coolant System was obtained. This method of startup serves to reduce the effluents diverted to the primary drain tank.

A thermal regeneration demineralizer can be used as a de-borating demineralizer without the use of the chiller portion of the system. This can be used to dilute the Reactor Coolant System down to very low boron concentrations towards the end of a core cycle. To make such a bed effective, the effluent concentration from the bed must be kept very low, close to zero ppm boron. This low effluent concentration can be achieved by using fresh resin. Use of fresh resin can be coupled with the normal replacement cycle of the resin; one resin bed being replaced during each core cycle. This operation serves to reduce the effluents diverted to the primary drain tank.

To prevent Reactor Coolant System boron dilutions during shutdown operations, the thermal regeneration demineralizers are isolated in accordance with the Technical Specifications.

In-Scope Boundary Description

The Chemical and Volume Control (CS) System license renewal boundary is discussed in the following section and is divided into the functional groupings of high-head injection, letdown, excess letdown, charging, seal water, thermal regeneration and boron/dilution.

High-Head Injection Portion of the Emergency Core Cooling System (ECCS) PID-1-CBS-LR20233, PID-1-SI-LR20446, PID-1-SI-LR20447, PID-1-SI-LR20449, PID-1-RH-LR20663, PID-1-RH-LR20662, PID-1-CS-LR20722, PID-1-CS-LR20726, PID-1-CS-LR20725:

The High Head Injection pumps are supplied with two suction flow paths for the Emergency Core Cooling System, one for Cold Leg Injection Phase, the second from the Cold Leg Recirculation Phase.

Injection Phase:

The boundary for the Chemical and Volume Control System starts at the suction of the centrifugal charging pumps at the CS/Containment Building Spray System interface where the pumps take suction from the Refueling Water Storage tank. The water continues through the pumps and 1-CS-FE-917 and 1-CS-FE-7448 and the boundary ends at the Safety Injection System interface. The charging pumps also supply the Reactor Coolant Pump seals, the flow path continues through the seal injection filters to the reactor coolant pump seals, the boundary ends at the containment penetration isolation 1-CS-V-168.

Cold Leg Recirculation Phase:

The boundary for the Chemical and Volume Control System starts at the suction of the centrifugal charging pumps at the CS/Residual Heat Removal System interface where the pumps take suction from the Residual Heat Removal Pumps which are supplied from the Containment Recirculation Sumps. The water continues through the pumps and 1-CS-FE-917 and 1-CS-FE-7448 and the boundary ends at the CS/SI interface. The charging pumps also supply the Reactor Coolant Pump seals, the flow path continues through the Seal injection filters to the reactor Coolant Pump seals, the boundary ends at the containment penetration isolation 1-CS-V-168.

Also included in both boundaries are the mini-flow recirculation flow paths through the seal water heat exchangers back to the suction of the centrifugal charging pumps.

Letdown Portion of the Chemical and Volume Control System Boundary PID-1-CS-LR20722, PID-1-CS-LR20723, PID-1-CS-LR20724, PID-1-CS-LR20725, PID-1-RH-LR20662, PID-1-RH-LR20663, PID-1-RC-LR20843, PID-1-RS-LR20252, PID-1-SI-LR20448, PID-1-SS-LR20519, PID-1-BRS-LR20854:

The boundary for the letdown portion (heat exchange, purification and degasification) of the Chemical and Volume Control System begins inside the reactor containment at the inlet to the regenerative heat exchanger. The boundary continues with the regenerative heat exchanger and continues with the connected piping and valves passing through the containment wall, mechanical penetration area and into the primary auxiliary building. Flow exits the letdown heat exchanger discharge line, passes through a pressure control valve/bypass, passes by relief valve line and a sample line before entering a temperature control valve. The outlet of the temperature control valve can be directed to the outlet of the demineralizer beds and/or to the demineralizer pre-filter before entering the inlet of the demineralizer beds. The boundary then divides and continues through three demineralizer vessels joining at their exit with the demineralizer bypass line and continuing to the reactor coolant filter. The boundary also includes the piping boundary of the Resin Sluicing System. The outlet of the reactor coolant filter includes a shutdown slipstream purification path to Residual Heat Removal pump suction. It then continues to the degasifier diversion valve where the boundary continues both to the bypass line (and a divert valve to the primary drain tank), a flow orifice and to the degasifier regenerative heat exchanger, degasifier pre-heater and the degasifier. The boundary continues with the degasifier outlet piping dividing into two degasifier recirculation pump suction lines, pumps and discharge lines. The pump discharges combine in a single line continuing through the regenerative heat exchanger, degasifier trim cooler and a startup bypass line. The boundary continues to the boron thermal regeneration diversion line and the hydrogen static mixer. From the mixer, the boundary joins with the diversion line and continues to the Chemical Volume Control Tank.

Excess Letdown Portion of the Chemical and Volume Control System Boundary
PID-1-CS-LR20726, PID-1-CS-LR20722:

The boundary for excess letdown begins with the reactor coolant connection at the Chemical and Volume Control System cold leg connection at loop three reactor coolant pump discharge. The boundary continues to and includes the excess letdown heat exchanger. At the outlet of the heat exchanger the boundary divides via a diversion valve to either a line connecting to the reactor coolant drain tank or, to the reactor coolant pumps seal water return header.

Charging portion of the Chemical and Volume Control System Boundary
PID-1-CS-LR20725, PID-1-CS-LR20722, PID-1-RC-LR20846, PID-1-SI-LR20446, PID-1-SI-LR20447, PID-1-SS-LR20518, PID-1-BRS-LR20854:

The charging portion of the Chemical and Volume Control System boundary continues with the volume control tank and outlet piping. The pipe divides to become the suction line for the positive displacement charging pump, the common suction for the two centrifugal charging and the residual heat removal common cross connect to safety injection/ charging pumps. The positive displacement charging pump includes the suction stabilizer, pump, stuffing box reservoir and oil cooler. The boundary continues with the discharge piping, pulsation damper and minflow line. Each centrifugal pump includes the pump, lube oil pump, cooler, filter and oil reservoir. The centrifugal pumps boundary continues with one recirculation line with a flow orifice per pump, a supply to the seal water portion of the Chemical and

Volume Control System boundary and a line to the high head safety injection (part of the Safety Injection System). The discharge piping includes a flow control valve and then joins with the Positive Displacement Pump discharge boundary piping and continues through the seal flow control valve, enters the mechanical penetration area, passes through two containment isolation valves and then enters the containment and proceeds through the tube side of the regenerative heat exchanger. At the outlet of the regenerative heat exchanger the boundary divides into three paths. The first boundary line leads to the pressurizer spray and the remaining two lines to Reactor Coolant loops one and four cold legs.

Seal Water Portion of the Chemical and Volume Control System Boundary PID-1-CS-LR20725, PID-1-CS-LR20726, PID-1-CS-LR20722, PID-1-WLD-LR20218, PID-1-RC-LR20841, PID-1-RC-LR20842, PID-1-RC-LR20843, PID-1-RC-LR20844:

The reactor coolant pump seal water boundary of the Chemical and Volume Control System begins at a connection upstream of the seal flow control valve and at the two centrifugal charging pump discharge lines (seal flow bypass lines). The boundary divides at the inlet to the two seal injection filters and recombines on the downstream side. The boundary piping enters the mechanical penetration area and divides into four sections, one for each reactor coolant pump. Each of the four lines is similar and includes a flow control needle valve and isolation valve. Each line then passes through a containment penetration and to, but not including, the respective reactor coolant pump seal. The four number one seal leakoff lines combine along with excess letdown and pass through a seal return isolation valve, flow orifice and combines in a single line with a containment isolation valve. The line exits the containment, enters the mechanical penetration area and passes through a containment isolation valve. The line then enters the Primary Auxiliary Building, continuing to the seal return filter and filter bypass line. The outlet piping of the seal injection return filter joins with the centrifugal charging pump recirculation lines and continues to the two series connected seal water heat exchangers and bypass line. The outlet boundary piping of the seal water heat exchangers divides and connects to the charging portion of the boundary at the top of the volume control tank and at the volume control tank outlet line downstream of the two series isolation valves.

At the reactor coolant pump seal outlet the four reactor coolant pump number two seal leakoff lines continue to and end at the reactor coolant drain tank inlet header.

Boron Thermal Regeneration Portion of the Chemical and Volume Control System Boundary
PID-1-CS-LR20723, PID-1-CS-LR20727, PID-1-CS-LR20722, PID-1-CS-LR20728, PID-1-RC-LR20843, PID-1-WLD-LR20219:

The boron thermal regeneration boundary of the Chemical and Volume Control System begins at the outlet of the three purification Chemical and Volume Control System demineralizers (discussed in the letdown portion of the Chemical and Volume Control System). The boundary piping continues to the tube side of the moderating heat exchanger, the tube side of the letdown chiller heat exchanger and its bypass line. The outlet of the letdown chiller includes a branch returning to the reactor coolant filter. The boundary then continues to the shell side of the letdown reheat heat exchanger and to the inlet piping of the thermal regeneration demineralizers. A borate/dilute valve and piping is included that accommodates the directional flows necessary to provide boration and dilution. The boundary also includes the piping boundary of the Resin Sluicing System. The piping recombines to a single line continuing to the shell side of the moderating heat exchanger. The outlet piping divides and either returns to the inlet of the reactor coolant filter (discussed in the letdown portion of the Chemical and Volume Control System) or joins with the boundary from the tube side of the moderating heat exchanger. A boundary line from the outlet piping of the regenerative heat exchanger in the Primary Auxiliary Building (discussed in the letdown portion of the Chemical and Volume Control System) continues to the tube side of the letdown reheat heat exchanger. The outlet returns to Chemical and Volume Control System letdown portion boundary piping just downstream of the reheat temperature control valve. The boron thermal regeneration chiller 1-CS-E-18, chiller surge tank, chiller pumps, piping and components are in dry layup and not in scope of License Renewal as the components have no intended function.

Boric Acid Makeup Portion of the Chemical and Volume Control System Boundary
PID-1-CS-LR20729, PID-1-CBS-LR20233:

The Boric Acid portion of the Chemical and Volume Control System boundary begins with the boric acid batching tank. The batch tank outlet boundary pipe leads to a valved line connected to both boric acid storage tanks outlet lines and a gravity boration line continuing to the charging pumps suction. Each boric acid storage tank is connected to the suction of a dedicated boric acid pump. The discharge of the boric acid pump divides into a recirculation line (with a Boron Recovery System fill line), a cleanup line and a line to the boric acid filter. The two boric acid pump discharge lines join to form a common line to the boric acid filter. A recirculation line is provided from the filter outlet to boric acid tank. The filter outlet line divides into emergency boration boundary piping to the charging pumps suction and the boric acid flow to the boric acid blender. The line to the blender has a flow control valve and a branch line providing an alternate emergency boration path to the charging pump suction. From the boric acid blender the path includes a flow straightener, a flow orifice and divides to supply five locations: the cesium removal demineralizer, spent fuel pool makeup, refueling water storage tank, the top of the volume control tank and the outlet of the volume control tank.

Boron Thermal Regeneration System Chiller
PID-1-CC-LR20212:

The boundary on this drawing includes the component cooling water to the non-nuclear safety chiller 1-CS-E-18-E and the vent valve. Also included in the boundary is the Safety Related Seal Water Heat Exchanger 1-CS-E-5-B.

Interfacing Drainage Drawings
PID-1-VSL-LR20775, PID-1-VSL-LR20776, PID-1-VSL-LR20777, PID-1-WLD-LR20222, PID-1-WLD-LR20223:

The boundary on these drawings are valve leakoff lines and drain lines from Chemical and Volume Control components shown on the CS boundary drawings.

Interfacing Systems

Not included in the Chemical and Volume Control System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Boron Recovery System
- Containment Building Spray System
- Demineralized Water System
- Nitrogen Gas System
- Primary Component Cooling Water System
- Radiation Monitoring System
- Reactor Coolant System
- Reactor Makeup Water System
- Release Recovery System
- Resin Sluicing System
- Residual Heat Removal System
- Safety Injection System

- Sample System
- Spent Fuel Pool Cooling System
- Valve Stem Leakoff System
- Vent Gas System
- Waste Processing Liquid Drains System

System Intended Functions

Provide high head safety injection for emergency core cooling.	10 CFR 54.4(a)(1)
Maintain programmed pressurizer water level (e.g. maintain required Reactor Coolant System inventory)	10 CFR 54.4(a)(1)
Maintain seal water injection flow to the reactor coolant pumps.	10 CFR 54.4(a)(1)
Control Reactor Coolant System chemistry, activity level, boron concentration, and makeup.	10 CFR 54.4(a)(1)
Provide backup high head injection capability.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Anticipated Transient Without a Scram (ATWS).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)

This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.3.4
- Section 6.2
- Table 6.2-83
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-BRS-LR20854
- PID-1-CBS-LR20233
- PID-1-CC-LR20212
- PID-1-CS-LR20722
- PID-1-CS-LR20723
- PID-1-CS-LR20724
- PID-1-CS-LR20725
- PID-1-CS-LR20726
- PID-1-CS-LR20727
- PID-1-CS-LR20728
- PID-1-CS-LR20729
- PID-1-RC-LR20841

- PID-1-RC-LR20842
- PID-1-RC-LR20843
- PID-1-RC-LR20844
- PID-1-RC-LR20846
- PID-1-RH-LR20662
- PID-1-RH-LR20663
- PID-1-RS-LR20252
- PID-1-SF-LR20483
- PID-1-SI-LR20448
- PID-1-SI-LR20449
- PID-1-SI-LR20447
- PID-1-SI-LR20446
- PID-1-SS-LR20518
- PID-1-SS-LR20519
- PID-1-VSL-LR20775
- PID-1-VSL-LR20776
- PID-1-VSL-LR20777
- PID-1-WLD-LR20218
- PID-1-WLD-LR20219
- PID-1-WLD-LR20222
- PID-1-WLD-LR20223

Table 2.3.3-3 Chemical and Volume Control System Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Bolting (Class 1)	Pressure Boundary
Filter Housing	Pressure Boundary
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary
Heat Exchanger Components	Heat Transfer Leakage Boundary (Spatial) Pressure Boundary
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (attached)
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle
Piping Element	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary
Pump Casing (High Head Centrifugal Charging Pump)	Pressure Boundary
Regenerative Heat Exchanger	Heat Transfer Pressure Boundary
Tank	Leakage Boundary (Spatial) Pressure Boundary
Thermowell	Leakage Boundary (Spatial) Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary
Valve Body (Class 1)	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-3, Summary of Aging Management Evaluation - Chemical and Volume Control System.

2.3.3.4 Chlorination System

System Description

The Chlorination System provides sodium hypochlorite solution for injection into the Circulating Water System. Provisions for continuous low-level chlorination and heat treatment of the tunnels are included for control of fouling by marine organisms.

Sodium hypochlorite is injected into a common header that receives flow from the Screen Wash System pumps. The flow from this common header flow to:

- Intake Tunnel
- Intake Transition Structure
- Discharge Transition Structure.
- Circulating Water pump bays
- Service Water pump bays

The Chlorination System is non-safety related.

In-Scope Boundary Description

PID-1-CL-LR20682, PID-1-CW-LR20673:

In the Discharge Transition Structure drywell area, the scoping boundary includes warm water supply pump, its suction line, recirculation line and the discharge line and pressure control valve. Also in the Discharge Transition Structure drywell area is a distribution header for unit one and two. Portions of the unit two header is not in boundary as it is dry and drained. In the Intake Transition Structure drywell area is an in-boundary distribution header that supplies spray to the incoming ocean water for unit one. The unit two spray is drained and out of scope. Also in the Intake Transition Structure drywell area is the normal Intake Tunnel chlorination supply and strainer.

In the Service Water Pump House is a portion of the chlorination supply header along with the distribution header serving unit one and two. A portion of the unit two header is drained and is not in-scope.

Interfacing Systems

Not included in the Chlorination System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Screen Wash System
- Circulating Water System

System Intended Functions

This system has components that perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Section 9.2.1
- Section 10.4.5

License Renewal Drawings

- PID-1-CL-LR20682
- PID-1-CW-LR20673

Table 2.3.3-4 Chlorination System
Components Subject to Aging Management review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Filter Housing	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The age management review results for these components are provided in Table 3.3.2-4, Summary of Age Management Evaluations - Chlorination System.

2.3.3.5 Containment Air Handling System

System Description

The Containment Air Handling System composed of three subsystems:

- Containment structure cooling system
- Containment recirculation/filter system
- Control rod drive mechanism cooling system

Containment Structure Cooling Subsystem:

The containment structure cooling subsystem is designed to maintain the normal ambient air temperature in the containment structure at or below 120ºF.

The containment structure cooling subsystem also functions to prevent the concrete temperature in the area of the reactor supports from exceeding 150 deg F, and the neutron detector cavity from exceeding 135ºF during normal operation.

The containment structure cooling subsystem cooling units are designed against overturning and structural failure during a Safe Shutdown Earthquake.

Containment Structure Recirculating Filter Subsystem:

This subsystem is normally used to filter contaminated air within containment prior to personnel entry, and whenever it is desired to reduce airborne particulate contamination and radioactive iodine. The filter subsystem, when operated in conjunction with the pre entry purge subsystem, reduces the airborne iodine to an acceptable level, permitting access to containment within 24 hours after the reactor is shutdown. The fans, ductwork and dampers associated with the containment recirculation subsystem are redundant and as such, a single failure will not render the system inoperative. Failure of the filter unit of the containment recirculation subsystem will not affect safe operation or shutdown of the plant since the air cleaning unit has no safety design bases.

In a recirculating mode, the filter section is bypassed and the redundant fans, dampers and ductwork provide containment atmospheric mixing to prevent excessive hydrogen stratification.

The fans, dampers and ductwork for the subsystem are ANS Safety Class 3, seismic Category I. The filter unit has no safety related function and is not seismic Category I.

Control Rod Drive Mechanism Cooling Subsystem:

The control rod drive mechanism cooling subsystem is designed to induce supply air into the control rod drive mechanism shroud at or below 120ºF.

The Containment Air Handling System also has two containment penetrations that are associated with a radiation monitor (1-RM-RM-6526).

In Scope Boundary Discussion

Containment Air Handling System
PID-1-CC-LR20207, PID-1-CC-LR20208, PID-1-CC-LR20214, PID-1-CC-LR20215, PID-1-MAH-LR20504, PID-1-MAH-LR20505, PID-1-MAH-LR20506 and PID-1-WLD-LR20219:

The boundary for the Containment Air Handling System sampling begins at the containment atmosphere and continues through a containment isolation solenoid, containment penetration, containment isolation solenoid up to the line designation “RM” (Radiation Monitoring). The sample return begins at the radiation monitor return line to containment designated “CAH” (Containment Air Handling) through one containment isolation solenoid, containment penetration, check valve, and to the containment. The boundary for the containment air cleaning portion of Containment Air Handling System begins at the containment atmosphere through two train related ducts, control dampers and fans then back to containment atmosphere. Alternately, the fans can draw containment air through a common in-scope filter unit using two train related control dampers. The containment structure cooling portion of the boundary consists of six cooling units including inlet filters, cooling coils, and piping up to the Primary Component Cooling Water System interface and tray drain lines. The boundary includes the individual fans and outlet dampers. The cooling units discharge into a common distribution duct which, through a network of balancing dampers, provides airflow and cooling to all areas of the containment.

Interfacing Systems

Not included in the Containment Air Handling System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Primary Component Cooling Water System
- Waste Processing Liquid Drains System

System Intended Function

The containment structure recirculating filter subsystem, when in the recirculation mode, bypasses the filter section and provides containment atmospheric mixing to prevent excessive hydrogen stratification	10 CFR 54.4(a)(1)
Provides safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS)	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.4.5.
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-CC-LR20207
- PID-1-CC-LR20208
- PID-1-CC-LR20214
- PID-1-CC-LR20215
- PID-1-MAH-LR20504
- PID-1-MAH-LR20505
- PID-1-MAH-LR20506
- PID-1-WLD-LR20219

Table 2.3.3-5 Containment Air Handling System
Components Subject to Aging Management Review

Component Type	Intended Function
Air Conditioner Housing	Pressure Boundary
Damper Housing	Fire Barrier Pressure Boundary
Drip Pan	Pressure Boundary
Ducting	Pressure Boundary
Ducting Closure Bolting	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Pressure Boundary
Flexible Connector	Pressure Boundary
Heat Exchanger Components	Heat Transfer Pressure Boundary
Instrumentation Element	Pressure Boundary
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-5, Summary of Age Management Evaluations - Containment Air Handling System.

2.3.3.6 Containment Air Purge System

System Description

The Containment Air Purge System provides supply air to the containment air distribution ducts, removes air from the containment exhaust ducts and vents to the unit plant vent. The supply and exhaust ductworks each have two containment isolation valves, one inside the containment and one outside the containment enclosure. The supply and exhaust ductwork are isolated on the outboard side of each containment penetration during plant Modes 1, 2, 3, and 4 by a blind flange using a resilient double o-ring seal design. Each penetration is isolable during Modes 5 and 6 by an in-board and/or outboard pneumatically activated butterfly valve. The containment isolation valves and associated ductwork (pipe) of the Containment Air Purge System are Safety Class 2, seismic Category I. The Containment Air Purge System provides the following functions:

Containment Structure Air Purge and Heating Subsystem:

The containment air purge and heating subsystem employs two supply fans and two exhaust fans with the common supply and exhaust ductwork. Each set consists of a supply air fan and exhaust air fan, each with pneumatically operated dampers. A common ductwork system, which includes the refueling purge supply and heating subsystem and the pre-entry purge subsystem.

Pre-Entry Purge Subsystem:

During pre-entry purge, a single fan supplies pre-entry purge air to the containment area using common supply ductwork. A single exhaust fan pulls air from containment through common exhaust ductwork and discharges directly to the unit plant vent after first passing through the filter unit and the containment air purge air cleaning unit.

Refueling Purge Subsystem:

A single fan supplies refueling purge and heating (when required) air to the containment area during the refueling operation using, as described above, the same ductwork as the pre-entry purge system. Dampers are used to isolate the non-operating system, in this case, the pre-entry purge. The 40,000 cfm exhaust air flow of the refueling purge subsystem first passes through a filter unit before discharging to the plant vent.

During refueling purge subsystem operation, Radiologically Controlled Area tunnel exhaust is maintained by operating the pre-entry purge subsystem in the same configuration as during Modes 1, 2, 3 and 4. Isolation dampers prevent recirculating air through the ductwork of the refueling purge exhaust subsystem.

Radiologically Controlled Area Tunnel Exhaust System:

An exhaust register located approximately at elevation 36'-0" in the Radiologically Controlled Area walkway exhausts the air supplied to the Radiologically Controlled Area tunnel. A ductwork system is routed from the register to the containment air purge cleaning unit.

In-Scope Boundary Description

PID-1-MAH-LR20504:

The boundary for the Containment Air Purge (CAP) System begins in the containment at a flexible connection in the ductwork from the reactor cavity fuel pool area, continues through a containment isolation valve, containment penetration ending at a testable blind flange in the containment annulus. The boundary continues starting at an adjacent blind flange, continues through an isolation valve ending at a flexible connection in the containment enclosure area. The boundary starts again at a flange downstream of filter 1-CAP-F-310 and ends with the fire damper at the Primary Auxiliary Building / Containment Enclosure Ventilation Area wall. The supply portion of the boundary starts with the fire damper at the Primary Auxiliary Building / Containment Enclosure Ventilation Area wall and continues through an isolation valve ending at a flange in the containment annulus. The boundary continues from a testable flange in the containment annulus through a containment penetration, a containment isolation valve and ending at a noted anchor point. In addition a segment of duct from the radioactive control area tunnel to filter 1-CAP-F-40 is in boundary from the Radiologically Controlled Area to Primary Auxiliary Building wall fire damper including a tornado damper and ending at an anchor point downstream of the tornado damper.

Interfacing Systems

The Containment Air Purge System does not interface with any license renewal systems.

System Intended Function

Provide safe shutdown control and indication (Post Accident Monitoring).	10CFR 54.4(a)(1)
Provide pressure relief protection in the event of a tornado (Tornado Dampers).	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Anticipated Transient Without a Scram (ATWS).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Environmental Qualification (EQ)	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.4.5.
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-MAH-LR20504

Table 2.3.3-6 Containment Air Purge System Components Subject to Aging Management Review

Component Type	**Intended Function**
Bolting	Pressure Boundary
Damper Housing	Fire Barrier Pressure Boundary
Ducting	Pressure Boundary Structural Integrity (Attached)
Ducting Closure Bolting	Pressure Boundary
Flexible Connector	Pressure Boundary Structural Integrity (Attached)
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)
Valve Body	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-6, Summary of Age Management Evaluation - Containment Air Purge System.

2.3.3.7 Containment Enclosure Air Handling System

System Description

The Containment Enclosure Air Handling System removes heat from areas associated with the containment enclosure, creates a negative pressure in the Containment Enclosure structure to capture post accident leakage from the containment and contiguous areas, and filters the effluent prior to release from the plant vent.

The containment enclosure and adjoining areas cooling systems are designed to remove equipment heat from the following areas during normal and emergency operation:

- Charging pump areas
- Safety injection pump areas
- Residual heat removal equipment areas
- Containment spray pump and heat exchanger equipment areas
- Mechanical penetration area
- Containment enclosure ventilation equipment area
- H2 analyzer room and electrical room areas
- RHR vault stairway area
- Electrical tunnel personnel walkway (electrical) area.

Containment Enclosure Cooling Systems:

The containment enclosure cooling units maintain the first six areas above at or below the safety-related equipment's maximum design operating temperatures during normal operation and following a loss of coolant accident, loss of offsite power, high and moderate pipe breaks, SSE and tornados.

Redundant containment enclosure cooling units are provided, each with an independent supply of primary component cooling water and emergency power, so that a single active failure will not cause a loss of cooling capacity. For normal operation, the containment enclosure cooling and ventilation system will maintain the areas served at or below 104°F for an outside temperature of 88°F or lower. Under emergency plant operation, the cooling units will limit the temperatures in the equipment areas to maximum design conditions, based on the transient peak temperature of the Primary Component Cooling Water system which serves as the cooling medium for the cooling units.

The containment enclosure area ventilation system functions so that the ventilation air is controlled to flow from areas of low potential radioactivity toward areas of higher potential radioactivity, and then exhausts to the unit plant vent for atmospheric dispersion. Radioactivity releases are maintained within the limits of the Technical Specifications by the emergency exhaust cleanup system.

H2 Analyzer/Electrical Rooms Ventilation System:

The H2 analyzer and electrical room supply fans maintain area 7 at or below the safety-related equipment's maximum design operating temperatures during normal operation and following a LOCA, loss of offsite power, high and moderate pipe breaks, and an SSE.

A redundant supply fan is provided with an emergency power source so that an active failure of one fan will not cause a loss of cooling capacity in the H2 analyzer and electric room areas. For normal operation, the H2 analyzer electrical room ventilation system will maintain the areas served at or below 104°F for an outside temperature of 88°F or lower.

The heating system consists of electric unit heaters each individually controlled by its own room thermostat.

RHR Equipment Vault Stairway Cooling System:

The RHR vault stairway chilled water cooling units maintain area 8 at or below safety-related equipment's maximum design operating temperature during normal operation. This temperature is 104°F coincident with an outside temperature of 88°F. The system provides auxiliary cooling to maintain area temperatures below 104ºF. The cooling system is non-safety related and is operated as required to maintain the desired area temperature.

Electrical Tunnel Personnel Walkway Cooling System:

The electrical tunnel personnel walkway chilled water cooling units maintain area 9 at or below safety-related equipment's maximum design operating temperature during normal operation. This temperature is 104°F coincident with an outside temperature of 88°F. The system provides auxiliary cooling to maintain area temperatures below 104ºF. The cooling system is non-safety related and is operated as required to maintain the desired area temperature.

Containment Enclosure Emergency Air Cleaning System:

The filter system consists of redundant filter trains, fans, dampers and controls and a common ductwork system. The air flow required to maintain a negative pressure in the Containment Enclosure Building is passed through demisters, which also function as prefilters, and through high efficiency particulate absorber filters located both upstream and downstream of the carbon filter prior to exhausting through the plant vent.

A ductwork cross-connection is provided between the two filter trains at a point between the downstream high efficiency particulate absorber filter and the fan inlet. Should the operating fan fail, this cross-connection will insure a continued air flow by manual startup of the redundant fan.

Each redundant filter train is complete, separate and independent from both electrical and control standpoints. Each filter train fan is supplied power from an independent engineered safety features power train source, which will furnish power to its fan during abnormal and post-accident conditions. The operation of mechanical equipment is controlled and monitored in the plant unit control room.

The containment enclosure cooling system and return fans and hydrogen analyzer and electrical room fans are designed to remain functional and will support continuous operation of safety class equipment during and after an SSE while assuming a loss of offsite power and a single active failure.

The containment enclosure cooling units, return fans, return dampers and ductwork and hydrogen analyzer and electrical room ventilation system fans, dampers and ductwork are classified as Safety Class 3 and seismic Category I.

In-Scope Boundary Description

PID-1-MAH-LR20495, PID-1-CC-LR-20205, PID-1-CC-LR-20211 and PID-1-WLD-LR20223:

The Containment Enclosure Air Handling (EAH) System boundary begins in the Containment Enclosure Ventilation Area at the inlet to two train related containment enclosure cooling units. Each cooling unit contains an inlet filter set, Primary Component Cooling Water cooling coils (with Waste Processing Liquid Drains), one fan and a discharge damper. The outlet boundary ducts of the two units join in a common duct with six branches supplying air flow via fire and balancing dampers to diffusers in the:

- Containment Enclosure Ventilation Area
- Mechanical penetration area

- Residual Heat Removal equipment vaults
- Charging pump CS-P-2A room
- Charging pump CS-P-2B room
- Charging pump CS-P-128 room

PID-1-MAH-LR20496 and PID-1-MAH-LR20495:

The return boundary for the mechanical penetration area begins from each Residual Heat Removal heat exchanger area through fire damper(s) combining in a common duct in the Primary Auxiliary Building. Passing from the Primary Auxiliary Building to the Containment Enclosure Ventilation Area through a fire damper and dividing to become the suctions of two return air fans with inlet dampers and ending as the fans discharge into the Containment Enclosure Ventilation Area. The return boundary for the three charging pump rooms begin in the individual rooms and continue individually through fire dampers to the Containment Enclosure Ventilation Area where the ducts join in a common duct that branches to two charging pump area return air fans and a duct connecting to the Primary Auxiliary Building Air Handling return duct.

PID-1-MAH-LR20495:

The Containment Enclosure Ventilation Area also contains the two emergency exhaust filter units. The boundary for the each cleanup unit begins at the inlet to the media filter, continuing to a high efficiency particulate absorber filter, charcoal filter, outlet high efficiency particulate absorber filter, charcoal bed cooling bypass line, damper, and associated filter fan. The outlet of each fan passes through a damper, combines and passes through a tornado damper. The boundary terminates at a ductwork support equivalent support leading to the plant vent.

PID-1-MAH-LR20503:

The Containment Enclosure Air Handling System boundary includes the hydrogen analyzer and electrical room cooling supply fans and return ducts. This boundary begins with a common outside air intake duct that divides to the back draft damper for each supply fan discharging to a damper. The duct then joins to form a single duct that passes through a filter and into the two rooms. Ducts in the rooms join to a common duct and damper and return the heated air to atmosphere.

PID-1-MAH-LR20508 and PID-1-WLD-LR20221:

The Containment Enclosure Air Handling System also bounds the air conditioner units for the vault glycol cooling loop. The boundary begins as the cooled glycol enters the building from outside. The piping divides to supply the six cooling unit heat exchangers. From the six cooling unit heat exchangers the boundary piping joins to form a common line and divides to the suctions of the two glycol pumps. The pumps discharge piping joins to form a single line. The boundary ends as the line exits the building. The system includes the drain line to waste liquid drains.

Interfacing Systems

Not included in the Containment Enclosure Air Handling system license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Primary Auxiliary Building Air Handling System
- Primary Component Cooling Water System
- Radiation Monitoring System
- Sample System

System Intended Functions

Maintain design temperature in Emergency Core Cooling System (ECCS) equipment areas during normal plant operation and during accident conditions.	10 CFR 54.4(a)(1)
Provide cooling with filtered outside air and heating with electric heaters to maintain design temperature in the hydrogen analyzer and electrical rooms during normal plant operation and during accident conditions.	10 CFR 54.4(a)(1)
Maintain a negative pressure within the containment enclosure ventilation area pressure boundary following an accident. Remove and retain airborne particulates and radioactive iodine. Exhaust filtered air to the plant vent stack.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide pressure relief protection in the event of a tornado (Tornado Dampers).	10 CFR 54.4(a)(1)

This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.4.6
- Section 6.5
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-CC-LR20205
- PID-1-CC-LR20211
- PID-1-MAH-LR20495
- PID-1-MAH-LR20496
- PID-1-MAH-LR20503
- PID-1-MAH-LR20508
- PID-1-WLD-LR20221
- PID-1-WLD-LR20223

Table 2.3.3-7 Containment Enclosure Air Handling System Components Subject to Age Management Review

Component Type	Intended Function
Air Conditioner Housing	Leakage Boundary (Spatial) Pressure Boundary
Bolting	Pressure Boundary
Damper Housing	Fire Barrier Pressure Boundary
Drip Pan	Pressure Boundary
Ducting	Pressure Boundary Structural Integrity (Attached)
Ducting Closure Bolting	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Leakage Boundary (Spatial) Pressure Boundary
Flexible Connector	Pressure Boundary Structural Integrity (Attached)
Heat Exchanger Components	Heat Transfer Pressure Boundary
Instrumentation Element	Pressure Boundary
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Pump Casing	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The age management review results for these components are provided in Table 3.3.2-7, Summary of Age Management Evaluations - Containment Enclosure Air Handling System.

2.3.3.8 Containment Online Purge System

System Description

The Containment Online Purge System provides supply air to the containment during normal operation and exhaust air from the containment to the plant vent filter. Valves in the exhaust line can be adjusted to establish containment pressure.

Online Purge Supply Air Equipment:

The containment online purge subsystem supply air fan draws filtered, preheated air from the Primary Auxiliary Building mechanical room at elevation 53'-0" and distributes it through an eight-inch supply air duct into the containment. Two inline butterfly valves are installed in the supply air line; one in the containment enclosure area and the other inside containment. Each valve is pneumatically activated, and is controlled by a separate redundant source so that a single failure will not prevent the closure of a given valve. The isolation valves are Safety Class 2, seismic Category I.

Online Purge Exhaust Air Equipment:

The online purge subsystem exhaust equipment collects air from the containment and exhausts it to the normal exhaust filter unit located in the Primary Auxiliary Building. This filtered air is then discharged to the plant vent.

The purge exhaust valves are non-nuclear safety related, and are in accordance with ANSI B16.5.

Two inline, isolation valves are installed in the exhaust air line. One valve is installed on each side of the containment. These valves are Safety Class 2, seismic Category I.

In-Scope Boundary Description

PID-1-MAH-LR20504, PID-1-MAH-LR20494:

The license renewal boundary for the Containment Online Purge System includes the supply and return ductwork that is attached to the safety related ductwork and valves that are providing containment isolation. The boundary for the Containment Online Purge System begins in the Primary Auxiliary Building at the discharge of the purge supply fan and flows through a back draft damper and two containment isolation valves and then into the containment atmosphere. The discharge flow path starts at the containment atmosphere and flows through two containment isolation valves and then normally to the plant vent through a filter. The alternate flow path bypasses the filter and is discharged directly to the plant vent.

Interfacing Systems

Not included in Containment Online Purge System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Primary Auxiliary Building Air Handling System
- Radiation Monitoring System

System Intended Functions

Provide safe shutdown control and indication (Post Accident Monitoring).	10CFR 54.4(a)(1)
Provide containment Isolation function.	10CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10CFR 54.4(a)(2)
This system contains components which perform functions credited for Anticipated Transients Without Scram (ATWS).	10CFR 54.4(a)(3)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10CFR 54.4(a)(3)

UFSAR References

- Section 9.4.5
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-MAH-LR20494
- PID-1-MAH-LR20504

Table 2.3.3-8 Containment Online Purge System Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Damper Housing	Structural Integrity (Attached)
Ducting	Structural Integrity (Attached)
Ducting Closure Bolting	Structural Integrity (Attached)
Flexible Connector	Structural Integrity (Attached)
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)
Valve Body	Pressure Boundary Structural Integrity (Attached)

The aging management review results for these components are provided in Table 3.3.2-8, Summary of Age Management Evaluation - Containment Online Purge System.

2.3.3.9 Control Building Air Handling System

System Description

Seabrook Station's control room complex occupies the entire 75'-0" elevation of the Control Building. The HVAC systems that service the control room complex are described below and in UFSAR Section 6.4, Habitability Systems. In addition, the redundant filter systems integral to the emergency makeup air and filtration subsystem are detailed in UFSAR. The control room complex HVAC system consists of the following subsystems:

- Control room safety-related air conditioning subsystem
- Control room nonsafety-related chilled water system
- Computer room air conditioning subsystem
- Control room normal makeup air subsystem
- Control room emergency air makeup and filtration subsystem
- Control room exhaust and static pressure control subsystem
- Control room air conditioning subsystem

The control room air conditioning subsystem includes both safety-related and non-safety related cooling subsystems. The safety-related and non-safety related cooling subsystems share a common recirculating air system located on elevation 75'-0" within the control room complex.

Control Room safety-related air conditioning subsystem:

The safety-related control room air conditioning subsystem consists of two full-sized identical air cooling trains that are independently electrically powered. One train is supplied from emergency Bus A, and the other from emergency Bus B. Each train consists of:

- A 100% capacity electric motor-driven water chiller
- Two (2) 100% capacity chilled water circulating pumps
- One (1) 100% capacity chiller condenser exhaust fan
- A back draft damper

- A 100% capacity air handling unit located in the recirculated control room air cooling stream

- Interconnecting piping, expansion tank and instrumentation and controls

Each electric motor-driven chiller is a factory fabricated package unit consisting of two (2) equal capacity refrigerant circuits with each circuit consisting of two (2) scroll type refrigeration compressors, a shell and tube evaporator and an air cooled condenser. The water chillers are located in the Diesel Generator Building mechanical equipment room on elevation 51'-6".

The chilled water recirculating pumps are electric motor driven, and are of the centrifugal type. These pumps circulate a glycol/water mixture through an air-cooled liquid chiller. The pumps are located in the Diesel Generator Building mechanical equipment room on elevation 51'-6".

The chiller condenser exhaust fans capture the heat rejected from the chillers into the mechanical equipment room and exhaust it to the outside via exhaust ductwork. They are located in the Diesel Generator Building mechanical equipment room on elevation 51'-6".

Each air handling unit consists of a medium efficiency flat filter, a cooling coil section and a fan section. The cooling coil section houses the safety-related chilled water cooling coil as well as the non-safety related cooling coil. One of the two (2) air handling units is always in operation irrespective of whether the non-safety related chilled water system or the safety-related chilled water system is in operation.

The air handling unit with its associated safety-related refrigeration equipment is designed to produce 58.7 tons of refrigeration, and is sized to meet the design emergency conditions requiring 53.1 tons of refrigeration, during normal plant conditions, the control room air conditioning subsystem can provide cooling to supplement the computer room if the computer room air conditioning unit is unavailable.

Control Room non-safety related chilled water system:

The non-safety related subsystem includes two chilled water pumps located in the Administration and Services Building mechanical room 1B. Each pump circulates a glycol/water mixture through an air-cooled liquid chiller located on the Administration and Services Building roof. The chilled water is then delivered to a chilled water cooling coil mounted within each of the safety related Control Building Air Handling System (CBA) evaporator fan units located in the Control Building, elevation 75 ft. mechanical room.

Safety-related evaporator fan units 1-CBA-FN-14A or -14B distribute and circulate the cooled air throughout the control room complex.

The non-safety related control room air conditioning subsystem will normally operate. In the event of a malfunction in the non-safety related subsystem, or during a loss of offsite power, one of two 100% capacity safety-related trains of control room air conditioning will be placed in service manually. The control room is supplied with conditioned air through a sheet metal duct system that is seismic Category I supported. Air is distributed through diffusers, as necessary, to maintain design room temperature. Return air is drawn from the control room through return air registers into the plenum above the ceiling. The return air is then drawn through the plenum and passes through the return air openings in the wall between the plenum and the mechanical equipment room. The return air, together with the makeup ventilation air, is drawn through the air conditioning unit for conditioning and recirculation.

Computer Room Air Conditioning Subsystem:

The computer room air conditioning subsystem has a recirculating air system which consists of a vertical unit located in the computer room. Conditioned air is discharged from the unit into a raised floor and then into the room through grills in the raised floor. Air is then returned through the face grills on the unit. The temperature and humidity controllers are factory installed and wired within the unit.

A glycol supply and return water system is used to remove the room heat load, using pumps and a dry cooler located on the Diesel Generator Building roof.

The control room air conditioning system ductwork contains manually controlled air dampers which in the open position permit utilization of the control room air conditioning capacity should the computer room air conditioning system be unavailable. The computer room ductwork is seismically supported, nonsafety-related.

Control Room Normal Makeup Air Subsystem:

During normal plant operation, the control room normal makeup air subsystem is aligned to deliver approximately 1000 cfm of outside air from both remote intakes (500 cfm per intake). With one normal makeup air fan operating and its associated discharge damper open, the intake isolation valves are positioned to allow equal amounts of air to be drawn from the east and west intakes. The normal makeup air flows through the prefilter and heater for each emergency filter unit and discharges via an orifice plate into the HVAC equipment room. The heater for each unit operates continuously to maintain the humidity at or below 70 percent relative humidity. The prefilters are periodically replaced when the differential pressure across the filters increases to a predetermined value, as a result of particulate buildup.

The continuous supply of makeup air to the control room HVAC equipment room maintains the complex at a positive pressure with respect to the outside and adjacent areas. This positive pressure precludes the infiltration of hazardous contaminants. The control room is maintained at a slightly greater positive pressure than the HVAC equipment room. The supply air also provides adequate air change out to preclude the buildup of stale air and noxious odors.

In the event normal makeup air fails or is isolated for reasons other than those delineated in UFSAR and below, appropriate operator action will be taken to re-establish makeup air. If makeup air is lost because of fan failure, the redundant normal makeup air fan and its discharge damper will be manually actuated. If makeup air is lost because of a vital bus outage or failure, or a loss of instrument air supply to the dampers, the emergency makeup air filtration subsystem will be manually actuated.

The remote air intakes are monitored for radiation and smoke. Each intake is designed with two fully redundant radiation monitoring systems. Following an accident when high radiation is detected in either remote air intake or when the emergency makeup air and filtration subsystem fans are actuated, the normal makeup air fans automatically trip off and their associated discharge dampers automatically close. The control systems for these fans and dampers are "cross-trained." That is, the discharge damper associated with the Train “A” fan is controlled by the Train “B” control loop and vice versa. This configuration ensures isolation of the normal makeup air subsystem by fan trip and/or damper closure regardless of any single active failure.

Each intake is provided with smoke detection capability to automatically alarm and permit operator-initiated isolation of control room normal makeup air subsystem. This isolation procedure would include manually starting the emergency cleanup filtration subsystem from the Main Control Board, which automatically isolates the normal makeup air subsystem. The HEPA filters associated with this filtration subsystem will remove smoke from incoming air. The effected intake can then be manually isolated.

All of the active components of the normal makeup air subsystem are redundant, and all are independently powered and controlled from independent emergency buses so that no single failure will impose operational limitations.

Control Room Emergency Makeup Air and Filtration Subsystem:

Following an accident, when high radiation is detected at either remote intake, or upon generation of an ‘S’ signal, both redundant emergency makeup air fans and their associated discharge damper are automatically actuated. Although the redundant filter system fans are designed to operate coincidently and stably in their parallel configuration, Operations may, at their discretion, shut down one of the systems during the course of the accident. Each filter system may also be initiated manually upon detection of smoke in either remote intake. Each emergency makeup air and filtration subsystem has a nominal capacity of 1100 cfm. This capacity is comprised of 600 cfm makeup air and 500 cfm recirculation air. These system flow rates have been calculated assuming both remote intake isolation valves are open to a throttle position allowing for 300 cfm makeup air from each intake. Following an accident, a contaminated remote intake does not have to be manually isolated. Design base analyses indicate that the makeup air dilution factor (i.e., 50 percent makeup air from "clean" intake, 50 percent air from contaminated intake) and the radioactive particulate and iodine removal capacity of the filters together are adequate to maintain control room doses below allowable limits for the 30-day accident mitigation period.

Control Room Exhaust and Static Pressure Control Subsystem:

During normal plant operation, the control room exhaust fan is operating and its discharge control damper modulates to maintain the control room complex at a pressure of at least + 1/8 " w.g. with respect to adjacent areas. The redundant exhaust isolation damper remains fully open.

The pneumatically-operated modulating damper in the exhaust ductwork controls the amount of air being exhausted and, thereby, maintains a positive pressure within the control room complex. The damper is under the control of three static pressure sensing devices. The first pressure sensing point for the complex is in the HVAC equipment room, which is at a slightly lower positive pressure than the remainder of the control room envelope. The mechanical equipment room, the second pressure sensing point, is kept at least 1/8" w.g. above the outside atmospheric pressure and at least 1/8" w.g. above the cable spreading room at all times, which is the third pressure sensing point.

Detection of high radiation in either remote makeup air intake or operation of either emergency makeup air and filtration subsystem fan will automatically isolate the exhaust and static pressure control subsystem. Under emergency conditions the exhaust subsystem remains isolated at all times.

During normal operation, 1000 cfm of makeup air will be delivered to the control room complex. Approximately 145 cfm will be exfiltrated and the remaining 855 cfm will be exhausted. Under emergency conditions, approximately 600 cfm of makeup air will be delivered to the control room complex all of which will be exfiltrated.

Battery Rooms and Switchgear Rooms:

The 4-kV switchgear areas, battery rooms and electrical tunnels are ventilated in the summer with filtered outside air, supplied from the Diesel Generator Building outside air intake. Each redundant switchgear train area has a supply fan, a return fan and supply and return ductwork. The battery rooms and electrical tunnels ventilation air is provided by the 4-kV switchgear area supply fans. The battery rooms have redundant exhaust fans and redundant supply and exhaust ductwork. The electrical tunnels have a single return fan and return ductwork. The supply air and exhaust air systems for the battery rooms are balanced to maintain the battery rooms under a negative pressure of approximately 0.1 inch H_2O, thereby preventing any hydrogen generated by the batteries from infiltrating the emergency switchgear areas.

In the winter the 4-kV switchgear areas, cable spreading area (see Subsection 9.4.9) and the electrical tunnel area air is recirculated and mixed with preheated outside air, as necessary, for makeup and to maintain the inside design temperature. The 4-kV switchgear areas and battery rooms have two ventilation equipment rooms, one for each train. The equipment rooms serve as a return air/makeup air mixing plenum. The heat required to offset building heat loss from the switchgear areas, battery rooms and electrical tunnels is supplied by hot water unit heaters located in the equipment rooms. Water line breaks or hot water system failures will not affect the operation of the switchgear areas or battery rooms.

Cable Spreading Room Ventilation:

This standby ventilation system consists of a single supply fan, a single return fan, and supply air and return air duct work. The system is only placed into service using administrative controls. When the system is in operation, the cable spreading room is ventilated in the summer with filtered outside air. In the winter, the cable spreading room ventilation system air is re-circulated and is mixed with preheated outside air, as necessary, for makeup and to maintain the inside design temperature. In addition, the supply air is reheated, when required, by a hot water heating coil in the supply ductwork to offset building heat losses. The cable spreading room ventilating system obtains makeup air and hot water for heating from the 4-kV switchgear area and battery rooms heating and ventilating system.

In-Scope Boundary Description

Control Building Air Handling Non-Safety Chilled Water
PID-1-CBA-LR20309:

The Control Building Air Handling non-nuclear safety control room air conditioning chilled water boundary begins as the piping enters the Control Building. It continues to a bypass control valve. The main piping divides and continues to both of the train associated fan coil units. The boundary includes four coils and coil drains. The coil outlet side boundaries combine into a single pipe and then join the temperature control bypass line and end at their exit from the control building.

Control Building Air Handling Safety Chilled Water
PID-1-CBA-LR20307, PID-1-CBA-LR20308, PID-1-CBA-LR20303:

The Control Building Air Handling safety related chilled water train “A” and “B” train boundaries are similar and begin at the outlets of the associated control room air conditioning cooling coils. The piping combines to form a common pipe that joins with the line from the temperature control bypass and head tank/head tank piping. The line then divides to form the inlets to the two chilled water pumps. The pumps and discharge pipe boundary join to form a common line to the chiller unit evaporator. The safety related chiller evaporator boundary includes the compressor, condenser, control panel and evaporator. The chill water outlet of the evaporator leads to a temperature control valve and divides to the two cooling coils of the associated control room air conditioner. Included to support the chillers heat rejection are two exhaust hoods, fans, back draft dampers and duct work to collect the heated air and exhaust it outside. Condensate pans and drain lines from both non-safety and safety related cooling coils are included ending at a local hub drain.

Computer Room Chilled Water
PID-1-CBA-LR20306:

The control room computer room air conditioning boundary begins as the chilled water enters the control room and continues to the floor mounted air conditioning unit. From the air conditioning unit the chilled water joins the included head tank, fill line and connecting pipe. The boundary ends as the piping exits the control building. Also included is the condensate drain and discharge piping ending as it exits the control building.

Control Room Air Handling
PID-1-CBA-LR20303, PID-1-CBA-LR20304, PID-1-CBA- LR20305:

The control room air conditioning air distribution boundary begins in the control building mechanical room on the 75’ elevation. Room air enters the filters of two train related air conditioner units and passes over chilled water coils of the non-safety and safety related chilled water units and enters the fan. The outlet duct of the “A” unit passes through a control damper and joins with a non-functional duct from the “A” emergency cleanup filter unit (a blank is installed in the duct). The duct continues through a fire damper and joins the duct for the “B” air conditioner unit. Room air enters the “B” unit and passes over chilled water coils of the non-safety and safety related chilled water units and enters the fan. The outlet duct of the “B” unit passes through a control damper and joins a duct leading through a fire damper to a bypass damper. The “A” and “B” combined duct continues through the in-boundary distribution ducting, flow adjusting dampers, fire dampers and diffusers to the main control room, offices, storage and the kitchen. Branch lines to alternate computer room cooling and data room cooling terminate at listed hanger supports. Return air flow from all areas flows through the included fire damper 1-CBA-DP-131.

The control room normal exhaust boundary begins at the discharge of the exhaust fan and includes the control room pressure control damper. The boundary continues with the back draft damper, isolation damper, tornado damper and ends upon exit from the building to atmosphere.

The control room fresh air and emergency cleanup boundary begins at yard located intakes (East and West) including the screens. The piping for both intakes then continues underground to the unit 1 diesel building where each line is provided with a drain and potable water filled trap that combine and terminate at cast iron storm drain hub. The intake line boundaries each continue through an isolation valve and combine in a common line and test plate. The line then divides to the suctions of two control room air supply fans and to two bypass dampers. The fans each discharge to an isolation damper and then join with the two outlet lines from the bypass dampers to form a single line which continues to the inlet plenum of the train “A” emergency clean-up filter in the control building mechanical room 75’ elevation. The line then continues to the inlet of the “B” filter through a back draft and control damper. Each of the included emergency clean-up filters units contains a pre-filter, heater, HEPA filter, charcoal filter and HEPA post filter. Each boundary also includes a filter fan, back draft damper and control damper. The boundary for “A” ends at the discharge duct to the mechanical room and duct to a blank off plate. The boundary for “B” ends at the discharge duct to the mechanical room.

Switchgear and Battery Room Air Handling
PID-1-CBA-LR20302, PID-1-CBA-LR20303:

The switchgear area boundary begins with two train related fan housings in the 50’ elevation of the mechanical room. Each boundary continues through duct work and a fire damper continuing to the associated 21’ 6” elevation essential switchgear room. In each switchgear room the duct divides with one duct leading to a non-safety section terminated at a listed seismic support. The ducts for each room end in area diffusers and one branch to the essential battery rooms. The “B” train supply supports two diffusers in the “A” train via a fire damper protected penetration. Outside air is supplied through a pair of fire dampers connecting the Diesel Generator mechanical room and the switchgear mechanical room.

The return air boundaries for both trains begin with return ducts (“B” train includes a duct extending into the “A” train via a fire damper). Both room return loop ducts join in ducts that extend to the 50’ mechanical room. The train related return boundaries include a fire damper, return air fan, back draft damper, a duct to a winter bypass damper, a control damper, tornado damper and fire damper ending outside the building in a missile proof enclosure.

Each train battery room supply includes a back draft damper, heater and two balancing dampers. A section of duct connects the two train related battery room supplies between the back draft damper and the heater via a fire damper in order to provide a cross train supply. Each train related battery return air boundary begins at return diffusers and continue through in-room fire dampers to join in a common duct leading to a wall fire damper and cross train suction duct with fire damper to provide cross train return. The return duct boundary continues to the associated control damper, exhaust fan and outlet damper. The “B” battery exhaust boundary continues through a fire damper and enters the “A” train mechanical room and joins “B” train battery room return forming a single duct exiting the building through a fire damper and tornado damper.

The cable spreading room and electrical tunnel return air boundary begins at the outlet of the associated fan continuing through the fan outlet damper to join the respective switchgear return duct downstream of the associated switchgear return fan outlet damper.

PID-1-DAH-LR20624:

The license renewal boundary consists of criterion (a)(3) Fire Protection components, which are the Control Building Air Handling System fire dampers.

Interfacing Systems

Not included in the Control Building Air Handling System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Potable Water System
- Radiation Monitoring System

System Intended Functions

The 4.16 KV switchgear area, battery rooms, and electrical tunnels heating and ventilation subsystems maintain room design temperature, and prevent the buildup of generated hydrogen gas in the battery rooms.	10 CFR 54.4(a)(1)
Provide Control Room Emergency Makeup Air and Filtration.	10 CFR 54.4(a)(1)
Provide Control Room Air Conditioning.	10 CFR 54.4(a)(1)
The control room exhaust and static pressure control subsystem is designed to maintain the control room complex at a positive pressure relative to adjacent areas, during normal plant operations.	10 CFR 54.4(a)(1)
Provide Control Room normal makeup air.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication.	10 CFR 54.4(a)(1)
Provide pressure relief protection in the event of a tornado (Tornado Dampers)	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 6.4
- Section 9.4.1
- Section 9.4.10
- Section 9.4.9
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-CBA-LR20302
- PID-1-CBA-LR20303
- PID-1-CBA-LR20304
- PID-1-CBA-LR20305
- PID-1-CBA-LR20306
- PID-1-CBA-LR20307
- PID-1-CBA-LR20308
- PID-1-CBA-LR20309
- PID-1-DAH-LR20624

Table 2.3.3-9 Control Building Air Handling System Components Subject to Age Management Review

Component Type	Intended Function
Air Conditioner Housing	Leakage Boundary (Spatial) Pressure Boundary
Bolting	Pressure Boundary
Compressor Housing	Pressure Boundary
Damper Housing	Fire Barrier Pressure Boundary Structural Integrity (Attached)
Drip Pan	Leakage Boundary (Spatial) Pressure Boundary
Dryer Housing	Pressure Boundary
Ducting	Pressure Boundary Structural Integrity (Attached)
Ducting Closure Bolting	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Element	Filter
Filter Housing	Pressure Boundary
Flexible Connector	Pressure Boundary Structural Integrity (Attached)
Flexible Hose	Pressure Boundary
Heat Exchanger Components	Heat Transfer Leakage Boundary (Spatial) Pressure Boundary
Heater Housing	Pressure Boundary
Instrumentation Element	Pressure Boundary
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping Element	Pressure Boundary

Component Type	Intended Function
Pump Casing	Pressure Boundary
Tank	Leakage Boundary (Spatial) Pressure Boundary
Thermowell	Leakage Boundary (Spatial) Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)

The aging management review results for these components are provided in Table 3.3.2-9, Summary of Aging Management Evaluation - Control Building Air Handling System.

2.3.3.10 Demineralized Water System

System Description

The Demineralized Water System serves no safety-related functions. It is designed as a non-nuclear safety, non-seismic Category I system, except for the containment penetration piping, and containment isolation valves, which are designed in accordance with Safety Class 2, seismic Category I requirements. Also, the makeup water piping connections to the Primary Component Cooling Water head tanks are designed in accordance with Safety Class 3, seismic Category I requirements. In addition, the interface piping with the Condensate Storage Tank and the Thermal Barrier Loop head pipe is safety Class 3.

The system is designed to provide a sufficient supply of demineralized water at a quality required for operation, makeup, and maintenance of the plant.

Water from the Water Treatment subsystem is directed to either a 500,000-gallon or 200,000-gallon Demineralized Water storage tank. From here, the water can be transferred to the condensate storage tank or distributed throughout the unit by means of the Demineralized Water System. If the demineralized water storage tanks are full or not available, it is possible to bypass these tanks and go directly from the water treatment plant to the condensate storage tank. The demineralized water transfer subsystem supplies initial fill and makeup to the various services within the Turbine, Administration, Containment, Primary Auxiliary, Fuel Storage, and Waste Processing Buildings, and the Condensate Polishing Facility. These services include reactor makeup, primary and secondary component cooling water, auxiliary boiler deaerator makeup, condensate polishing regeneration, emergency showers and eye wash stations, generator stator cooling, and maintenance flushing of systems and components located within the plant.

In-Scope Boundary Description

Primary Auxiliary Building
PID-1-DM-LR20350, PID-1-DM-LR20351, PID-1-DM-LR20352, PID-1-CC-LR20205, PID-1-CC-LR20211, PID-1-RMW-LR20360, PID-1-SB-LR20626, PID-1-RR-LR20061:

The Demineralized Water boundary begins as the header enters the Main Steam and Feedwater Pipe Chase. The boundary includes hose connections, instruments, instrument rack supplies, eyewash stations, drain lines, radiation monitor flush lines, sump flush lines and chemistry sample panels in the areas detailed below.

The Primary Auxiliary Building Demineralized Water boundary includes supplies to the Steam Generator Blowdown flash tank 1-SB-TK-40, Primary Component Cooling Water System head tanks 1-CC-TK-19A and 19B, alternate charging pump cooling, Reactor Makeup Water storage tank, Boron Thermal Regeneration System chiller surge tank, a flush line to the Primary Auxiliary Building sump, the letdown degasifier and Release Recovery tank 1-RR-TK-258.

The Primary Auxiliary Building boundary continues to the Containment Enclosure Ventilation Area and includes a supply to the plant vent loop seal fill line. The Primary Auxiliary Building header then continues to the containment penetration area, Residual Heat Removal Equipment Vault 1 and 2 and through penetration X-36 to the Reactor Containment.

Containment
PID-1-DM-LR20352:

The Primary Auxiliary Building header comes into containment that includes the piping and valves that provide a pressure boundary for penetration X-36, a supply to the Thermal Barrier Loop Head Tank, the fuel transfer console and two relief valves.

Fuel Storage Building
PID-1-DM-LR20352:

The Primary Auxiliary Building header then continues to the Fuel Storage Building and supplies the cleanup filter trap priming lines, the cask loading pool spray header and the fuel transfer control panel.

Tank Farm
PID-1-DM-LR20356, PID-1-RMW-LR20360:

The Waste Process Building header enters the Tank Farm area which includes the fill lines for the Reactor Makeup Water tank vent and overflow seal cups.

PID-1-DM-LR20355, PID-1-DG-LR20461, PID-1-DG-LR20466:

Demineralized water supply piping and valves located in the Diesel Generator Building that supplies Diesel Generator expansion tank 1-DG-TK-46A and 1-DG-TK-46B.

PID-1-DM-LR20349, PID-1-CO-LR20426:

The Condensate Storage Tank Demineralized Water makeup line from a pipe anchor through series check valves DM-V-611/612 up to the Condensate Storage Tank. The Condensate to Demineralized Water cross connect valve 1-DM V 530 and Demineralized water to the condensate storage tank.

PID-1-WLD-LR20223:

Demineralized Water line to the Primary Auxiliary Building sump A.

PID-1-SS-LR20518:

Demineralized Water supply to the reactor coolant Sample System line from Loops one and three.

PID-1-SS-LR20519:

Demineralized Water supply to the Primary System Sample sink 1-SS-MM-13B.

PID-1-SS-LR20520:

Demineralized Water supply to the Post Accident Sample Panel 1-SS-CP-419.

PID-1-SS -LR20521:

Demineralized Water supply to the Steam Generator Sample System Sample Panel 1-SS-SP-166B.

PID-1-SF-LR20483:

Demineralized Water relief valve 1-DM-V-693 discharge to floor drain 184 in the Primary Auxiliary Building.

PID-1-FW-LR20690:

Demineralized Water to the Sample System cooler 1-SS-E-184, and Sample System sink 1-SS-SS-2.

PID-1-DF-LR20200:

Demineralized Water from a safety shower discharge to the Main Steam and Feedwater Pipe Chase west sump.

PID-1-SF-LR20482:

Demineralized Water to Sample System sink 1-SS-SS-003.

PID-1-WLD-LR20220:

Demineralized Water line to the Fuel Storage Building sump A.

PID-1-WLD-LR20221:

Demineralized Water line to the Residual Heat Removal Equipment Vault 1 sump A.

PID-1-CC-LR20209:

Demineralized Water line to the Thermal Barrier Loop Head Pipe.

Interfacing Systems

Not included in the Demineralized Water system license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Chemical and Volume Control System
- Condensate System
- Diesel Generator System
- Fuel Handling System
- Mechanical Seal Supply System
- Primary Component Cooling Water System
- Radiation Monitoring System
- Reactor Coolant System
- Release Recovery System
- Sample System
- Spent Fuel Pool Cooling System
- Steam Generator Blowdown System
- Waste Processing Liquid Drains System

System Intended Functions

Provide Condensate Storage Tank integrity.	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.2.3
- Table 6.2-83

License Renewal Drawings

- PID-1-CC-LR20205
- PID-1-CC-LR20209
- PID-1-CC-LR20211
- PID-1-CO-LR20426
- PID-1-DF-LR20200
- PID-1-DG-LR20461
- PID-1-DG-LR20466
- PID-1-DM-LR20349
- PID-1-DM-LR20350
- PID-1-DM-LR20351
- PID-1-DM-LR20352
- PID-1-DM-LR20355
- PID-1-DM-LR20356
- PID-1-FW-LR20690
- PID-1-RMW-LR20360
- PID-1-RR-LR20061
- PID-1-SB-LR20626
- PID-1-SF-LR20482
- PID-1-SF-LR20483
- PID-1-SS-LR20518
- PID-1-SS-LR20519
- PID-1-SS-LR20520
- PID-1-SS-LR20521
- PID-1-WLD-LR20220
- PID-1-WLD-LR20221
- PID-1-WLD-LR20223

Table 2.3.3-10 Demineralized Water System
Components Subject to Age Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Drip Pan	Leakage Boundary (Spatial)
Filter Housing	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping and Fittings (Containment Isolation)	Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary
Valve Body (Containment Isolation)	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-10, Summary of Aging Management Evaluation - Demineralized Water System.

2.3.3.11 Dewatering System

System Description

Seabrook Station was not originally designed with a Dewatering System, because it was believed that the in leakage prevention methods described in UFSAR Section 3.4.1.1 (Flood Protection Measures for Seismic Category I Structures) would be adequate to prevent water ingress. Over the years, it has become evident that the mitigation methods were not completely effective at preventing in leakage.

A plant Dewatering System has been installed which can further mitigate in leakage of groundwater in the lower elevations of the plant. The purpose is to routinely pump water from beneath the plant structures, to reduce the static hydraulic head outside the building concrete and reduce the in leakage. This allows the original mitigative measures to function properly. A pump is installed in the existing well at (+) 7’ elevation of the Primary Auxiliary Building. This pump discharges the water to the Roof Drains System, which then flows to the Storm Drain System and out to Circulating Water for discharge.

Existing pipe penetrations located in the (-) 26 elevation of the Emergency Feedwater Pump House have been utilized as a groundwater low point. These penetrations have been directed to a nearby sump. This sump discharges to the existing plant Storm Drain System.

A pump is installed in the Residual Heat Removal Vault "B" stairwell at (-) 61' elevation of the Equipment Vault. This pump discharges the water to the Roof Drains System, which then flows to the Storm Drain System and out to Circulating Water for discharge. Routine monitoring of this flow path is performed per station operating procedures.

A pump is installed in the containment annulus at (–) 32' elevation. This pump discharges the ground water in the containment annulus to the roof drain system. The connection to the drain system is installed at 240 degrees azimuth of the containment annulus. Routine monitoring of this flow path is performed per station operating procedures.

A ground water collection tank and pump are installed in the "B" Electrical Tunnel, west stairwell at (-) 20'-0" elevation. The pump discharges the water to the turbine building Roof Drains System, which then flows to the Storm Drain System and out to Circulating Water for discharge via the outfall. Routine monitoring of this flow path is performed per station operating procedure.

In-Scope Boundary Description

PID-1-DW-LR20600:

The Dewatering (DW) System boundary for the Primary Auxiliary Building begins at the 7’ elevation with pump 1-DW-P-436 through an orifice, the discharge check valve to a flex hose. From the flex hose the boundary continues including an isolation valve, drain line, strainer, flow indicator, isolation valve and check valve up to the connection at the roof drain piping. A branch connection goes to the Fuel Storage Building to the sample sink.

The boundary for the West Electrical Tunnel portion of the Dewatering System begins at the two connections at (-)26’ elevation of the “B” Electrical Tunnel, through isolation valves joining in a common line to a local sample and isolation valve ending at the Electrical Tunnel sump.

The Residual Heat Removal Equipment Vault Dewatering System boundary begins at (-)61’ elevation piping through an isolation valve and to a pressure gage, to the skid mounted components for 1-DW-SKD-153. From the skid mounted pump the boundary continues through isolation valves, flow totalizer, sample reservoir, and sample connection continuing on to the Roof Drain System. The boundary also includes the chemical addition tank, valves, flex hose and suction line through a chemical addition pump, instruments and valves; joining the Dewatering System piping just downstream of the first ground water tap isolations.

The Containment Annulus Dewatering System boundary begins at (-)30’ elevation at azimuth ~240° and continues to the sump for 1-DW-P-441. The boundary continues with pump 1-DW-P-441 through discharge flex hose & piping, valves, a flow totalizer, a reservoir, ending at the connection to the Roof Drains connection. The boundary also begins at the chemical addition fill connection in the Primary Auxiliary Building, through the flex hose and piping in the West Main Steam and Feedwater Pipe Chase stairwell and through flex hose, piping and valve to the chemical addition tank, 1-DW-TK-306 located into the Containment Enclosure Ventilation Area. The boundary continues from the tank through discharge piping, valves, and flex hose to the suction of the chemical addition pump. The boundary includes pump discharge piping, valves (including the pressure control valve) and pump relief to the Dewatering System line just downstream of the first isolation valve.

PID-1-DW-LR20601:

The boundary for the East Electrical Tunnel Dewatering System begins at two ground water isolation taps at elevation (-)20’ through isolation valves joining in a common line with isolation valve to and including a collection tank. From the collection tank the boundary continues through a dewatering pump suction line and isolation valve through the pump and discharge piping and check valve, through a flow totalizer, isolation valve and ending where the line leaves the electrical tunnel and enters the turbine building. The boundary also includes the chemical addition suction line upon entry into the electrical tunnel and continues through the two chemical addition pumps, instruments, and valves, joining the Dewatering System piping just downstream of the first ground water tap isolations.

PID-1-DF-LR20200:

The boundary consists of non-safety related components which are the drain lines from the Dewatering System.

PID-1-DR-LR20633:

The boundary consists of non-safety related components which are the drain lines from the Dewatering System

PID-1-SF-LR20483:

The boundary consists of non-safety related components which is the sample line going to Sample System sink 1-SS-SS-7.

Interfacing Systems

Not included in the Dewatering System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Plant Floor Drain System
- Roof Drains System
- Sample System

System Intended Functions

This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Section 3.4.1.2

License Renewal Drawings

- PID-1-DF-LR20200
- PID-1-DR-LR20633

- PID-1-DW-LR20600
- PID-1-DW-LR20601
- PID-1-SF-LR20483

Table 2.3.3-11 Dewatering System
Components Subject to Aging Management Review

Component Type	**Intended Function**
Bolting	Leakage Boundary (Spatial)
Filter Housing	Leakage Boundary (Spatial)
Flexible Hose	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Orifice	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Piping Element	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-11, Summary of Aging Management Evaluation - Dewatering System.

2.3.3.12 Diesel Generator

System Description

The standby power supply is provided by two redundant diesel engine generators of identical design and characteristics which supply onsite power of sufficient capacity and capability to reliably shut down the reactor. The Diesel Generator System includes the skid mounted Diesel Generators and their auxiliaries.

Diesel Generator:

The Emergency Diesel Generators have a continuous rating of 6,083 kW. The capacity of each Diesel Generator is adequate to support operation of engineered safety feature loads.

Each Diesel Generator is connected to a 4160-volt emergency bus as shown in UFSAR Figure 8.3-1 and UFSAR Figure 8.3-10. The capacity of each Diesel Generator is sufficient to meet the safety features demand caused by a loss of offsite power with or without a coincident loss-of-coolant accident.

Diesel Generator Auxiliaries:

Each Diesel Generator includes the auxiliaries necessary for operation, connection to the 4160-volt emergency bus, and connections to the required services. No auxiliaries are shared between the Diesel Generator systems. External power sources, other than DC control power from the unit's station batteries, are not required for starting or subsequent operation. The Diesel Generator auxiliaries include the lube oil system; the fuel oil system, the air start system; the cooling water system; and the air intake, exhaust and crankcase vacuum system.

Each Diesel Generator unit and its auxiliaries are located in a separate and independent enclosure within a seismic Category I building. The reinforced concrete enclosure wall between Diesel Generators has a three-hour fire rating and is designed to withstand explosions and stop postulated missiles from the adjoining Diesel Generator and its auxiliaries. The Diesel Generator and its auxiliaries, which are essential for the operation are designed in accordance with Category I seismic requirements.

Separate and independent heating and ventilating equipment is provided for each Diesel Generator system to supply adequate air for control of the ambient temperature. The heating and ventilation system for the Diesel Generator system is described in Section 2.3.3.13.

Diesel Generator Lube Oil System Description:

Each Diesel Generator has an independent lubrication system. Lube oil is taken from the sump, filtered, cooled and pumped to engine components and returned to the sump. There are two lube oil circuits, one for the main engine lubrication and the other for the rocker arms.

Engine lube oil is pumped through the system by the engine driven pump. The discharged oil is pipe to a three way temperature controlled valve. If the temperature of the oil is above the recommended temperature, the valve will divert lube oil to the cooler, then through a strainer before entering the main engine. The oil collects in the crankcase and is available for suction back to the lube oil circuit. A motor driven auxiliary lube oil pump will operate in the event that a low pressure is detected at the discharge of the strainer.

The rocker lube system is separate from engine lube system. Lube oil to the diesel engine rocker arm is provided by the engine driven rocker arm lube pump, is filtered and returns to the oil reservoir tank. A motor driven rocker arm lube pump is available.

When the engine is not operating, the motor driven engine prelube and filter pump operates continuously, drawing oil from the sump through a suction strainer and discharging the oil through an electric heater, a 5 micron filter and into the lubrication system downstream of the three way temperature control valve.

Diesel Generator Fuel Oil System Description:

Each Diesel Generator has a completely independent fuel oil storage and transfer system consisting of a fuel oil storage tank, transfer pump and interconnecting piping for supplying fuel oil to the day tank which, in turn supplies fuel oil to the engine skid.

Fuel oil from the storage tank is transferred to the Diesel Generator day tank by the Diesel Generator fuel oil transfer pump, a motor driven positive displacement pump. The fuel oil level in the day tank controls the operation of the transfer pump.

Fuel oil from the day tank is pumped to the injector pumps by the fuel oil pumps. The injector pumps are cam-operated and feed the injectors, mounted in the heads for combustion. Engine high pressure fuel return is to the day tank, while the low pressure gravity drain is to the dirty fuel oil reservoir.

Diesel Generator Air Start System Description:

Each diesel engine has an independent starting air system capable of starting the engine within ten seconds and an independent control air system. The engine is designed for a 435 psig, air-over piston starting system with separate solenoid valve and starting air distributor for each bank of cylinders. On initiation of a start signal, starting air is applied to both banks of cylinders simultaneously to accelerate the engine to provide rated frequency and voltage in less than 10 seconds. Each portion of the starting system has an independent receiver, supply line, air start valve and distributor, and supplies starting air to half of the engine cylinders (one bank). If either portion of the starting system should fail, the other portion, already activated, will continue to apply starting air to the engine.

Starting air is supplied by the starting air compressor assembly which includes a starting air compressor and two receivers, all mounted on a common skid. The air discharging from the compressor passes through a pulsation dampener, moisture trap, air dryer, dryer prefilter, dryer after filter, and check and stop valves before entering the receivers. Normally, both receivers will be fully loaded to provide a continuous supply of air. Pressure relief and blowdown valves are included on both receivers.

The receivers also provide instrument air at 100 psi and 20 psi to other engine system components through pressure reducing valves. These components include the auxiliary cooling water pump solenoid valves and cooling water temperature control valves.

Each diesel engine has an available backup control air compressor that can be aligned to the receivers in the event that the starting air compressor is not available to provide control air. This unit is comprised of a compressor, cooler, moisture trap, filter, and dryer, and will supply sufficient air to the receivers to support long-term operation of the engine.

Diesel Generator Cooling Water System Description:

Each Diesel Generator has a completely independent closed-circuit cooling water system which circulates treated demineralized water to the diesel engine components requiring cooling. The system consists of heat exchangers, engine driven pumps, motor driven pump, expansion tank and interconnected piping for supplying water to the diesel engine skid.

When the Diesel Generator is operating, removal of heat from the cooling water is accomplished by circulating cooling through the shell side of the main heat exchanger located in the Primary Auxiliary Building, with Service Water circulating through the tubes.

There are two engine driven cooling water pumps, the jacket cooling pump and the air cooler pump and two motor driven pumps, the auxiliary coolant pump and the standby jacket circ pump.

The engine driven jacket coolant pump discharges cooling water to the engine cylinder walls and turbo charger prior to being returned through the main heat exchanger.

The engine driven air cooler pump discharges cooling water to the air cooler, generator bearing and the lube oil cooler.

The motor driven auxiliary auto starts when either or both of engine driven pumps fail. The motor driven jacket circulating is started when the engine is not operating.

Diesel Generator Air Intake, Exhaust and Crankcase Vacuum System Description:

The Diesel Generator combustion air intake and exhaust system is capable of supplying adequate combustion air and disposing of resultant exhaust products to permit continuous operation of the diesel engine. The Diesel Generator combustion air intake and exhaust system consists of an intake filter, plenum, exhaust silencer, and interconnecting piping.

The intake air is filtered by a dry-type air intake filter, passes through the intake plenum, and is piped to the Diesel Generator turbochargers. The intake filters reduce the airborne particulate matter in the combustion air during engine operation. The combustion air is compressed by the turbochargers and delivered to the cylinder heads by the inlet manifold.

The exhaust gases are manifolded through the turbochargers and exhausted to atmosphere through an exhaust silencer. The point of discharge is physically separated from the intake point to preclude degradation of engine function due to dilution of the intake air by exhaust gases.

Each engine is equipped with a crankcase exhauster to provide positive crankcase ventilation. The exhauster discharge is piped to a discharge point outside of the Diesel Generator Building. The crankcase exhauster is not safety-related and is not required for operation of the engine.

In-Scope Boundary Description

The boundary discussion the follows is for the train “A” Diesel Generator. The discussion also applies to the “B” Diesel Generator.

Lube Oil
PID-1-DG-LR20458, PID-1-DG-LR20463:

The boundary of the lubricating oil system begins at the engine lubricating oil suction strainer and continues through the common suction piping. The boundary divides into two lines: one, to the engine driven lube oil pump with internal relief and two, to the motor driven lube oil pump with external relief. The discharge piping boundary of the engine driven pump includes a supply to rack boost. The discharge boundary of both pumps flows through check valves and join to form a common line that continues to a temperature control valve that directs flow to, or bypasses the lube oil cooler. A 3/8 in. continuous vent is provided as part of the boundary.

The lube oil supply boundary continues to the lube oil strainer and to the main distribution header where the piping boundary includes the supply lines to the main bearings, the barring device, a supplemental bearing, inner and outer thrust bearings, cam shaft drive gears, water pump bearings, governor drive gears, the overspeed trip device and end cam shaft bearings. The piping boundary continues to the left and right bank air start distributors and to the left and right bank intermediate camshaft bearings, push rods, rollers, and injection pump rollers. The piping continues to the left and right bank air start distributors and foggers. Also connected is the supply to the oil reservoir float control valve.

Left and right rocker arm drain boundary piping leads to an oil reservoir tank. A common suction line from the tank supplies the motor driven rocker arm pre-lube and engine driven rocker arm lube oil pump. The outlet boundary of the pumps joins in a common line to the duplex strainers and then to each of the diesel cylinder sets.

A suction line from the lube oil sump to the pre-lube filter pump strainer is included in the boundary. The boundary continues with the strainer and joins the return piping boundary from the oil reservoir warming loop. The piping then continues to the pump and lube oil heater. The outlet of the lube oil heater divides to supply the oil reservoir warming loop and the five micron filter. The boundary piping then joins the main lube oil at the inlet to the strainer to provide pre-lubrication and engine heating.

Fuel Oil
PID-1-DG-LR20459, PID-1-DG-LR20464:

The diesel fuel oil system boundary begins outside the diesel building at a fill connection and enters the diesel building and connects to both “A” and “B” train fuel oil storage tanks. The storage tank boundary includes a flame arrestor vent located outside the building. The boundary continues at the outlet of the fuel oil tank through a set of duplex strainers and a fuel oil transfer pump. The outlet of the pump continues to the day tank. The fuel oil day tank boundary includes a flame arrestor vent located on the diesel building roof. The tank boundary includes a connection to a roof mounted relief valve, drain connection and an overflow returning excess fuel to the storage tank. The diesel fuel supply boundary continues with a tank outlet line through a pair of duplex strainers and dividing to supply both the engine and motor driven fuel oil pumps. The outlets of the pumps join and continue through a duplex strainer to an accumulator tank and the fuel inlet headers for the engine fuel injectors. Fuel not used by the injectors is collected and returned to the fuel oil day tank through the fuel return headers. Fuel that is not collected in the fuel return header is collected in the drain header and flows to the “dirty” oil reservoir and gravity drains to the fuel oil storage tank. The boundary includes normally isolated train cross connect piping for the fuel oil storage tank, fuel oil transfer pump discharge, fuel oil day tank overflow/drain and the “dirty” oil drain.

Starting Air
PID-1-DG-LR20460, PID-1-DG-LR20465:

The diesel starting air boundary begins at the inlet filter for the air compressor and includes auto drains, traps and drain manifold to drains. The boundary continues with the compressor cooling pipe, pulsation damper, pre-filter, dryer and post filter to the receiver inlet header. In parallel, the backup air start skid boundary begins with the compressor, after cooler, trap, pre-filter and dryer to the receiver inlet header. The air supplied to the header divides and includes both starting air receivers. The outlet of each starting air receiver divides to a cylinder bank associated air start solenoid and main air start valve supply. The boundary for the main air start valve includes the barring gear interlock. The main air start supplies also include a connection to the four shuttle valves that control fuel rack boost (full throttle start). The shuttle valves select the air source and allow boost if: there is no engine overspeed, the shutdown solenoid is not energized and engine driven lube oil is satisfied. The outlet of the main air start valve divides to the cylinders and is controlled for engine starting by the air start distributor. The engine associated “A” air receiver outlet includes a connection that divides to service the shutdown air tank and shutdown solenoid valve, and the engine control air and backup pump control valves.

Cooling Water
PID-1-DG-LR20461, PID-1-DG-LR20466, PID-1-WLD-LR20222:

The Diesel Generator cooling water system consists of two interconnected closed loop subsystems. A backup motor driven pump capable of supporting both engine system loops is also provided. Beginning at a common line at the outlet of the Diesel Generator heat exchanger, the boundary piping divides into:

The first portion of the boundary connected to the engine driven air coolant pump suction line with connections to the expansion tank, auxiliary coolant pump suction, and a return line from the generator bearing cooler. The boundary continues with the air coolant pump and discharge piping, return line from the auxiliary coolant pump and a line supplying the generator bearing cooler. The boundary includes a temperature control valve that modulates flow to the turbocharger intercoolers based on combustion air temperature. The boundary includes the piping to and from the intercoolers and the return piping to and including the lube oil heat exchanger and the lube oil heat exchanger outlet to the inlet of the Diesel Generator component water heat exchanger.

The second portion of the boundary connected to the jacket cooling temperature control valve. The temperature control valve modulates to change the bypass flow and thus control jacket water return temperature. The outlet boundary piping from the temperature control valve leading to the suction of the Jacket coolant pump includes connections to the expansion tank, auxiliary coolant pump suction and a return from the governor lube oil cooler. The jacket coolant pump discharge connects with the return from the auxiliary coolant pump and continues to the lower end of the cylinder jackets up and through the cylinder heads. A parallel boundary continues to and from the turbo for bearing cooling. The combined return piping divides to either return to the temperature control valve or to the inlet of the Diesel Generator component water heat exchanger. A small pipe from the return common line to the surge tank provides continuous venting.

The jacket water standby circulation pump and heater boundary begins at the return line at the temperature control valve inlet and continues through the pump, piping and heater, returning to the jacket cooling inlet.

The auxiliary coolant pump is provided for events where either of the engine driven pumps fail. The suction boundary connects to the suctions of both the air coolant pump and the jacket coolant pump through air operated valves. The discharge piping connects similarly to the pump discharges.

Air intake, exhaust and crankcase vacuum
PID-1-DG-LR20462, PID-1-DG-LR20467:

The diesel intake boundary begins on the 51’6” elevation of the Diesel Generator Building with an intake filter and divides into piping connecting to the right and left bank turbochargers.

The diesel exhaust starts at the right and left bank turbochargers, joins the exhaust silencer and continues through the roof to a protective shield.

The crankcase exhauster boundary includes two connections to the engine crankcase, connecting piping and one flow orifice. The two lines join and include the crankcase exhauster ending at the inlet of the discharge flex connection. Failure of the exhauster does not affect the starting capability of the engine.

Interfacing Systems

Not included in the Diesel Generator System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Demineralized Water System
- Waste Processing Liquid Drains System

System Intended Functions

Provide an independent onsite power supply to train-related vital busses if preferred power sources are interrupted.	10 CFR 54.4(a)(1)
Provide and receive process control signals to initiate and satisfy diesel engine starts, load sequencing and load shedding.	10 CFR 54.4(a)(1)
Provide system status via indications and alarms.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 8.3
- Section 9.5
- Table 7.5-1

License Renewal Drawings

- PID-1-DG-LR20458
- PID-1-DG-LR20459
- PID-1-DG-LR20460

- PID-1-DG-LR20461
- PID-1-DG-LR20462
- PID-1-DG-LR20463
- PID-1-DG-LR20464
- PID-1-DG-LR20465
- PID-1-DG-LR20466
- PID-1-DG-LR20467
- PID-1-WLD-LR20222

Table 2.3.3-12 Diesel Generator
Components Subject to Age Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Dryer Housing	Pressure Boundary
Expansion Joint	Pressure Boundary
Fan Housing	Structural Integrity (Attached)
Filter Element	Filter
Filter Housing	Pressure Boundary
Flame Arrestor	Leakage Boundary
Flexible hose	Leakage Boundary (Spatial) Pressure Boundary
Heat Exchanger Components	Heat Transfer Pressure Boundary
Heater Housing	Pressure Boundary
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary
Orifice	Pressure Boundary Structural Integrity (Attached) Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)
Piping Element	Leakage Boundary (Spatial) Pressure Boundary
Pump Casing	Pressure Boundary
Silencer	Pressure Boundary
Strainer	Filter
Tank	Pressure Boundary
Thermowell	Pressure Boundary

Component Type	Intended Function
Trap	Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (attached)

The aging management review results for these components are provided in Table 3.3.2-12, Summary of Aging Management Evaluation - Diesel Generator System.

2.3.3.13 Diesel Generator Air Handling System

System Description

The Diesel Generator Building heating and ventilating system functions to remove heat generated in the building during normal and emergency conditions and also maintains the design winter indoor building temperature. Ventilation is provided by the Diesel Generator Air Handling System. Electric heaters provided in each day tank room are included in the Diesel Generator Air Handling System. The remainder of the Diesel Generator Building heating function is provided by the Hot Water Heating System and is evaluated separately.

Diesel Generator Air Handling System:

A separate ventilation system, consisting of one supply air and one exhaust air fan, an automatic roll filter, and associated dampers, is provided for each of the redundant Diesel Generators, Train A and Train B. Each supply fan is equipped with a mechanical backdraft damper to prevent backward fan rotation due to reverse air flow. Each of the supply and exhaust fans, as well as the roll filter drive, is powered from its respective train to provide 100 percent redundancy. All of the fans and roll filters are located at elevation 51'-6" of the Diesel Generator Building.

The ventilation systems are redundant; therefore, a single active failure of one ventilation system will not prevent the other ventilation system from operating.

Loss of offsite power will not affect the ventilation systems, since the exhaust dampers fail open and each set of Diesel Generator Building supply and exhaust fans is connected to separate trains of the Emergency Electrical Power System.

Electric unit heaters are provided in the day tank rooms of the Diesel Generator Building, so the temperatures in the rooms do not fall below minimum design temperature. The explosion-proof unit heaters are controlled by room thermostats. A low temperature switch in each room will alarm (on the computer panel located in the control room) if the room temperature falls to a predetermined setpoint.

In-Scope Boundary Description

Diesel Generator Air Handling System
PID-1-DAH-LR20624:

The Diesel Generator Air Handling (DAH) System consists of one supply and one exhaust fan and associated dampers provided for each of the redundant Diesel Generators. Heating is provided by four hot water unit heaters located in each Diesel Generator room, and is evaluated as part of the Hot Water Heating System. Electric unit heaters are provided in the day tank rooms so the temperatures there do not fall below minimum design temperature. The supply air passes through louvers and an automatic roll filter.

The boundary of the system begins with the two train associated supply fans taking suction on diesel building air on the 51’6” elevation and each discharging through a discharge damper, fire damper and ductwork into the respective diesel room. The two train associated exhaust fans take suction via a damper and Fire damper on the area atmosphere at the 49’ foot elevation of the Diesel Generator rooms. Two in boundary supply and outlet fire dampers facilitate the ventilation of the respective Diesel Fuel Oil Day Tank rooms. Attendant instrumentation is included in the boundary.

Interfacing Systems

The Diesel Generator Air Handling System does not interface with any license renewal systems.

System Intended Functions

Diesel Generator Room HVAC and Flammable Vapor Control. Remove heat rejected by the Diesel Generators and building lighting, during normal operation, maintain Diesel Generator room temperature during worst case operation of the Diesel Generators at their continuous rating, and exhausts sufficient air from the rooms to prevent accumulation of a flammable fuel-vapor mixture.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.4.8
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-DAH-LR20624

Table 2.3.3-13 Diesel Generator Air Handling System Components Subject to Aging Management Review

Component Type	Intended Function
Damper Housing	Fire Barrier Pressure Boundary
Ducting	Pressure Boundary
Ducting Closure Bolting	Pressure Boundary
Flexible Connector	Pressure Boundary
Fan Housing	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-13, Summary of Aging Management Evaluation - Diesel Generator Air Handling System.

2.3.3.14 Emergency Feedwater Pump House Air Handling System

System Description

The function of the heating and ventilating systems is to maintain the inside temperature of the emergency feedwater pump-house within design limits for both normal and emergency feedwater system operation during summer and winter.

The ventilation function is provided by the Emergency Feedwater Pump House Air Handling System. The heating function is provided by the Hot Water Heating System and is evaluated separately.

The Emergency Feedwater Pump House is ventilated and cooled with outside air supplied through one of the two redundant supply fans and its tornado gravity intake damper with pneumatic test operator, and exhausted through its tornado exhaust damper with pneumatic operator. Each fan and its exhaust damper are controlled by a separate room thermostat. Setpoints are staggered to avoid simultaneous operation of redundant equipment. The Emergency Feedwater Pump House high temperature is alarmed.

The redundant, seismic Category I, Safety Class 3, pump room supply fans, supply and exhaust dampers and the Class 1E fan motors, each with electrical power from a separate Engineered Safety Features power source, assure continued ventilation should a Safe Shutdown Earthquake, loss of offsite power or a single failure occur. Loss of air or electrical power to the pneumatically operated supply and exhaust dampers will cause them to fail open.

In-Scope Boundary Description

PID-1-MAH-LR20503:

The Emergency Feedwater Pump House Air Handling (EPA) System boundary begins at the intake tornado dampers for the two supply fans and continues through the fans and the exhaust dampers on the outlet of the supply fans. The two exhaust tornado dampers located in the walls of the Emergency Feedwater Pump House are included in the boundary.

Interfacing Systems

The Emergency Feedwater Pump House Air Handling system does not interface with any license renewal systems.

System Intended Functions

Maintain Emergency Feedwater Pump House area design temperatures during normal and emergency operation.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide pressure relief protection in the event of a tornado (Tornado Dampers).	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.4.11
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-MAH-LR20503

Table 2.3.3-14 Emergency Feedwater Pump House Air Handling System Components Subject to Aging Management Review

Component Type	Intended Function
Damper Housing	Pressure Boundary
Ducting	Pressure Boundary
Ducting Closure Bolting	Pressure Boundary
Fan Housing	Pressure Boundary
Flexible Connector	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-14, Summary of Aging Management Evaluation - Emergency Feedwater Pump House Air Handling System.

2.3.3.15 Fire Protection System

System Description

The plant Fire Protection System is a non-safety related system designed to detect and alarm, control and extinguish fires that may occur. To accomplish this end, the concept of defense in depth is a criterion for design. This concept, applied to fire protection, aims at a balanced program which will:

a) Prevent fires from starting.

b) Detect fires quickly, and quickly suppress those that occur, thus limiting their damage.

c) Design and locate plant equipment such that if a fire occurs and burns for a long time, despite a) and b) that essential plant activities will still be performed.

d) Ensure that neither inadvertent operation nor failure of a system will induce a failure of any safety-related system.

Fire Prevention:

The plant fire protection system utilizes design aspects which employ separation criteria, noncombustible material, fire barrier divisions, fire rated penetrations for conduit, cable, piping and ductwork, as well as fire dampers. Fire barrier floors and walls, including all penetrations, have a design fire rating commensurate with the hazard. Physical separation or fire barriers are provided between redundant systems or equipment. In addition, fire stops are provided in long vertical cable tray runs to further ensure the non-propagational properties of the cables. These fire stops are provided where no other fire barriers exist.

Plant equipment location and separation to limit fire-related damage is discussed in detail in the report "Seabrook Station Fire Protection System Evaluation and Comparison to Branch Technical Position 9.5-1, Appendix A" and "Fire Protection of Safe Shutdown Capability (10 CFR 50, Appendix R)."

Detection Systems:

Fire detection devices are provided in areas which are judged to contain sufficient combustibles to present a fire hazard.

Fire detectors are installed consistent with the type of fire anticipated. A minimum of two detectors of any type are provided in each fire zone or fire area. Failure of one detector will not affect the operability of any other detector. The detectors are positioned within the zone or areas so that the flow of air or pressure differences will not affect proper operation of the detector.

The fire detection system contains supervisory panels to monitor the detector status. Fire detectors alarm at the control console in the control room to provide rapid identification of the location of any fire so that corrective action can be initiated.

Charcoal filter fire detection systems sense carbon monoxide to provide an early warning of a fire within the charcoal filter bed being monitored. Each charcoal filter located outside of containment is monitored by sample probes which are located both upstream and downstream of the charcoal beds. Control modules process signals from the sample probes and initiate alarms to the Fire Detection System upon detection of a high carbon monoxide concentration. Within containment, filter 1-CAH-F-8 is monitored by a self-contained Sample System which draws a sample from the downstream side of the charcoal filter. The Sample System initiates an alarm to the Fire Detection System upon detection of a high carbon monoxide concentration. Alarms are initiated by the Fire Detection System on the fire control panel located in the control room.

Suppression Systems:

Fire suppression capability is provided by installed systems which include water supply, pumps, valves and piping that supply hose stations, wet and preaction sprinklers, and deluge spray systems. Portable fire extinguishers are provided, where appropriate, and installed gas suppression systems are used where water would cause a hazard to equipment or personnel.

Water Supply:

The water supply for the plant fire protection system is obtained from two 500,000-gallon heated water storage tanks, of which 300,000 gallons in each tank is reserved for fire protection. Water for fire protection is supplied to the system by one 1500-gpm motor-driven centrifugal fire pump and one 1500-gpm diesel engine-driven centrifugal pump which provide the system design capacity. A second 1500-gpm diesel engine-driven centrifugal fire pump is provided as a spare. Each pump is capable of taking suction from either tank.

Two 25-gpm motor-driven centrifugal pressure maintenance jockey pumps maintain fire system pressure, and prevent unnecessary starting of the main fire pumps.

The fire pumps and jockey pumps are housed in a pump house adjacent to the fire tanks. The pump house is heated and ventilated to maintain suitable ambient conditions for pump operation. Each fire pump is separated by a three-hour rated fire barrier wall, with each bay containing sprinklers and combination fixed temperature rate-of-rise detectors or ionization detectors which alarm at the Main Control Board.

Electric power for the motor-driven fire pump and jockey pumps is obtained from a 460-volt load center. An alternate feed from a second 460-volt load center is supplied to the main motor-driven fire pump.

Yard Piping:

Fire Protection water is supplied to the plant via a closed loop main. The fire main is a 12-inch cement-lined steel piping system, coated and wrapped on the outside for corrosion protection or, Fibercast, Factory Mutual approved, Class 1614, pipe. The fire pumps are arranged to discharge to either half of the loop, with provisions included to permit both pumps to discharge into either half of the loop, if a portion of the main is out of service.

Each branch line from the fire main is equipped with a normally open post-indicating valve. Additional, normally open post-indicating valves are installed in the main to permit isolation of individual main sections for service or repair without affecting the operation of the balance of the main system.

Yard Protection:

Fire protection is provided to the exterior plant areas by fire hydrants located along the loop at about 250-foot intervals. Hose houses are provided complete with necessary associated accessories at alternate hydrant locations. Hydrants are located to provide coverage for each building.

Deluge Systems:

Hydraulically designed, automatic deluge systems are provided in the following areas containing safety-related systems or equipment:

- Diesel Generator Building fuel oil day tank area
- Control Building cable spreading area.
- Hydraulically designed, automatic deluge systems are provided in the following areas housing non-safety related equipment:
- Generator step-up transformers
- Unit auxiliary transformers
- Reserve auxiliary transformers

- Feed pump turbine lube oil conditioner
- Hydrogen seal oil unit
- Main turbine lube oil conditioner and oil reservoir
- Hydraulic fluid power unit
- Turbine lube oil storage tank.

Each deluge valve system contains an automatic deluge valve, system actuation detectors, supervisory control panel with local flow indication provisions included, and remote annunciation at the control console in the control room. The deluge valves and manual actuators are located in areas remote from the protected areas. The systems are provided with 24-volt DC power for operation, should main power be unavailable.

Wet Pipe Sprinkler Systems:

Wet pipe sprinkler systems are installed in the following non-safety related areas:

- Turbine Building below turbine generator operating floor elevation 75'-0" and below the mezzanine floor elevation 46'-0" and 50'-0"
- Turbine Building heater bay below the roof and below floor elevation 50'-0
- Administration Building Storage Area
- Steam generator feed pump areas
- Lube Oil Storage Building
- Diesel Generator Building sump
- Mechanical Maintenance Storage Facility
- Leased Makeup Water Treatment System room and Administration Building Storeroom
- Administration Building (first floor)
- Chlorination Building
- Condensate Polisher Facility
- Alternate Health Physics Checkpoint

Wet pipe sprinkler systems are provided with heat-actuated, closed head, fusible sprinklers with a local flow-actuated alarm. The flow alarm will cause the annunciation of a fire condition in the control room.

Preaction Sprinkler Systems:

Preaction sprinkler systems are installed in the following safety-related areas:

- Cable tunnels from Control Building to containment
- Cable tunnels from Control Building to Primary Auxiliary Building
- Electrical penetration areas outside containment
- Primary Auxiliary Building at elevation 25'-0" and the electrical chase
- Diesel Generator Building fuel oil storage tank rooms and the fuel oil piping trenches.

Preaction sprinkler systems contain valve actuation provisions from fire detectors to charge the system with water, which will then discharge from any sprinkler head fused-open by a fire. Fire detection is annunciated at the control console in the control room and on a local control panel.

Manually Operated Pre-Action Sprinkler Systems:

Manually operated sprinkler systems are provided for the following areas:

- Turbine generator bearings,
- Lube oil piping from bearings to guard pipe
- Diesel Generator rooms

Manual operated sprinkler systems are provided for the Supplemental Emergency Power System enclosures (each Diesel Generator and switchgear enclosure). Water is supplied to the sprinkler piping from a fire hydrant utilizing fire hose. Fire detectors in the area annunciate a fire condition at the control console in the control room and on a local control panel.

Standpipe Systems:

The Turbine Generator Building, the Mechanical Maintenance Storage Facility, the Administration and Service Building, Containment, Control Building, Primary Auxiliary Building, Fuel Storage Building, Waste Process Building, Residual Heat Removal equipment vault, Diesel Generator Building and Emergency Feedwater pump area are provided with fire hose stations at approximately 100-foot intervals around or within the building or stairwells to provide coverage, using 100 feet of hose. Each hose station consists of 1½ inch hose with Factory Mutual approved accessories.

The Turbine Generator Building hose stations are supplied from two looped building mains fed from two branch lines supplying the building from separate sections of the 12-inch yard fire main.

Two branch lines from separate sections of the yard fire main, backed up by a branch line from the safety-related plant service water system and booster pump, supply water to the standpipe hose stations in the Residual Heat Removal equipment vault, Primary Auxiliary Building, Fuel Storage Building, Diesel Generator Building, Control Building, and Emergency Feedwater pump area. These systems are designed to be operational following an SSE.

To provide increased reliability for cooling safety-related components, a cross-connect from the Fire Protection and Demineralized Water systems to the PCCW System is included in the system design. This cross-connect can be used to provide cooling water to the charging pump lube oil coolers or provide emergency makeup water to safety-related portions of the PCCW System. This cross-connect is backed up by a seismic Category I Service Water System and booster pump makeup source.

Standpipes in safety-related areas are designed and supported as seismic Category I systems to prevent pipe failure and subsequent pipe whip. This feature also applies to deluge water spray and preaction sprinkler systems installed in safety-related areas.

Portable Fire Extinguishers:

Portable fire extinguishers are located throughout the plant as the primary fire-fighting provisions in those areas determined to have negligible fire hazard, and as secondary defense in areas containing fixed fire protection systems. Portable fire extinguishers were selected on the basis of the most suitable type for the hazard present, with the radiological, metallurgical, physical and chemical compatibility of the extinguishing agents with plant components in mind. The types of portable extinguishers provided are pressurized water, Halon 1211, dry chemical and CO_2.

Halon 1301 Fire Extinguishing Systems:

A Halon 1301 fire extinguishing system is installed in the following non-safety related area:

- Main computer room (in Control Building)

Halon 1301 systems contain valve actuation provisions from fire detectors to discharge the gas for total flooding of the area experiencing a fire. Fire detection is annunciated at the control console in the control room and on a local control panel. The detection system also contains provisions to close all doors, and to close dampers in the air supply and ducts to the rooms, thus isolating the affected area from adjacent rooms.

In-Scope Boundary Description

PID-1-FP-LR20266, PID-1-WT-LR20041:

The Fire Protection (FP) System license renewal boundary has two 500,000-gallon water storage tanks with 300,000 gallons in each tank reserved for fire protection. The outlets of both tanks join in a common header that connects to the suctions of the three fire pumps and the two jockey pumps. A connection from the water treatment system provides a makeup capability to the tanks, with the water treatment portion of the piping as the pressure boundary preventing loss of water from the fire protection tanks.

The two engine-driven fire pumps include a cooling loop supplied by the discharge of the respective pump. All three fire pumps have installed relief valves that return flow to the fire tanks and test valves that can be aligned to return to either tank through the same piping as the relief valves. The discharge piping for the electrically driven pump provides the connection to the fire pump house sprinkler system.

Two jockey pumps are provided to makeup for small system leakage and maintain system pressurization. Two circulating pumps and Auxiliary steam heated heat exchangers maintain tank temperature.

The three fire pumps connect to the closed loop yard main.

PID-1-FP-LR20274, PID-1-FP-LR20268, PID-1-FP-LR20269, PID-1-FP-LR20270, PID-1-FP-LR20271, PID-1-SW-LR20795:

The boundary continues with the yard main and connections to the following in scope buildings and listed systems with in the building:

Reactor Containment

- Dry standpipe hose connections

Electrical tunnels - Emergency Feedwater Pump House

- Two zones of pre-action sprinkler systems

Unit 1 turbine building loop (two connections)

- Seventeen deluge spray systems
- Connection to the lube oil storage sprinkler header
- Four connections to the turbine building sprinkler header
- Hose stations

Diesel Generator Building – one feed per train

- Preaction for fuel oil storage tank rooms and the fuel oil piping trenches.
- Deluge for day tank room

Two connections to the Tank Farm include:

- SSE based Fire Protection booster pump and piping
- Hose reels in Waste Process Building, Diesel Generator Building, Emergency Feedwater Pump House (and emergency condensate makeup), Residual Heat Removal Equipment Vaults, Primary Auxiliary Building stairwells North and South, Fuel Storage Building, Main Steam and Feedwater Pipe Chase, and “A” and “B” Centrifugal Charging Pump backup cooling.

Primary Auxiliary Building and Tunnel pre-action valves for:

- Electrical tunnels. Control room to Primary Auxiliary Building / Residual Heat Removal
- Primary Auxiliary Building vertical electrical chase
- General area and below trays
- Waste Processing Building Stairwell Hose Stations

Yard hydrant and hose stations are included in the boundary

The feeds to buildings that are not in scope for license renewal and can be isolated per the abnormal operating procedure for a fire main break are not in scope of license renewal.

PID-1-FP-LR20272, PID-1-FP-LR20273:

The Fire Protection boundary on these prints list the valve details for the in scope deluge, alarm, flooding, and pre-actuation valve for the fire protection system.

Interfacing Systems

Not included in the Fire Protection System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam Heating System
- Fuel Oil System
- Instrument Air System
- Primary Component Cooling System
- Service Water System

System Intended Functions

Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.5.1
- Table 6.2-83
- Appendix A
- Appendix R

License Renewal Drawings

- PID-1-FP-LR20266

- PID-1-FP-LR20268
- PID-1-FP-LR20269
- PID-1-FP-LR20270
- PID-1-FP-LR20271
- PID-1-FP-LR20272
- PID-1-FP-LR20273
- PID-1-FP-LR20274
- PID-1-SW-LR20795
- PID-1-WT-LR20041

Table 2.3.3-15 Fire Protection System
Components Subject to Age Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Filter Element	Filter
Filter Housing	Pressure Boundary
Flexible Hose	Pressure Boundary
Heat Exchanger Components	Pressure Boundary Heat Transfer
Instrumentation Element	Pressure Boundary Leakage Boundary (Spatial)
Piping and Fittings	Pressure Boundary Leakage Boundary (Spatial)
Piping and Fittings (Containment Isolation)	Pressure Boundary
Piping Element	Pressure Boundary Leakage Boundary (Spatial)
Pump Casing	Pressure Boundary
Sprinkler Head	Pressure Boundary Spray
Tank	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary
Valve Body	Pressure Boundary

Component Type	Intended Function
(Containment Isolation)	
Vortex Plate	Direct Flow

The aging management review results for these components are provided in Table 3.3.2-15, Summary of Aging Management Evaluation - Fire Protection System.

2.3.3.16 Fuel Handling System

System Description

The new fuel storage facilities are located within the Fuel Storage Building and are designed to facilitate the safe handling, inspection and storage of new fuel assemblies and control rods. Space is provided for handling and storage of 90 new fuel assemblies, which is equal to a core load plus 25 spare assemblies.

The Fuel Transfer System includes an underwater, electric-motor-driven, transfer car that runs on tracks extending from the Containment refueling canal through the transfer tube and into the Fuel Storage Building refueling canal. A hydraulically actuated lifting arm is on each end of the transfer tube. The fuel container in the refueling canal receives a fuel assembly in the vertical position from the refueling machine. The fuel assembly is then lowered to a horizontal position for passage through the transfer tube. After passing through the tube, the fuel assembly is raised to a vertical position for removal by a tool suspended from the Spent Fuel Pool bridge and hoist in the Fuel Storage Building refueling canal. A system of lifting arms and hydraulic cylinders is used to raise and lower the fuel containers containing the fuel assembly. The cylinders are powered by hydraulic pumping units and controlled by electronic consoles. The pumping units and consoles (one each in the Containment and Fuel Storage Building, designated 1-FH-RE-44 and 1-FH-RE-45, respectively) are located on the operating deck of each building. The Spent Fuel Pool Bridge and hoist then moves to a storage loading position and places the spent fuel assembly in the spent fuel storage racks.

During reactor operation, the transfer car is stored in the Fuel Storage Building refueling canal. The quick closure hatch is engaged closed on the containment refueling canal end of the transfer tube to seal the reactor containment. The terminus of the tube in the Fuel Storage Building is closed by a valve.

In-Scope Boundary Description

The License Renewal boundary for the Fuel Handling (FH) System consist of Criterion (a)(2) components that are associated with the hydraulic systems for the tilt mechanisms located inside and outside of the containment. A system of lifting arms and hydraulic cylinders is used to raise and lower the fuel container which contains the fuel assembly being transferred. The cylinders are powered by hydraulic pumping units (1-FH-RE-44 and 1-FH-RE-45) and are located on the operating deck of the Containment and Fuel Storage Buildings. Portions of the system's hydraulic pumps, tubing, valves and accumulators are exposed to the local area.

PID-1-DM-LR20352:

This consists of the piping between the fuel transfer console and the fuel upending machine inside Containment and the piping between the fuel transfer system control panel and the fuel upending machine inside the Fuel Storage Building.

The Fuel Storage Building penetration sleeves, fuel transfer tube and bellows, spent fuel pool storage racks, spent fuel pool liner, new fuel storage area and racks, spent fuel pool gates and fuel handling cranes are civil/structural components, and for License Renewal, are evaluated with the Fuel Storage Building structure.

Interfacing Systems

Not included in the Fuel Handling System license renewal scoping boundaries are the following interfacing system, which is separately evaluated as license renewal systems:

- Demineralized Water System

System Intended Functions

This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Section 9.1.1
- Section 9.1.4

License Renewal Drawings

- PID-1-DM-LR20352

Table 2.3.3-16 Fuel Handling System
Components Subject to Age Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Flexible Hose	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Piping Element	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-16, Summary of Aging Management Evaluation - Fuel Handling System.

2.3.3.17 Fuel Oil System

System Description

The Fuel Oil System provides fuel to the two diesel driven fire pumps, 1-FP-P-20A and -20B. There are two fuel tanks, each dedicated to a diesel driven fire pump.

In-Scope Boundary Description

PID-1-FP-LR20266, PID-1-FO-LR20938:

The Fuel Oil System boundary begins with the two fuel oil day tanks and includes a fill alarm, piping and flash arrestor on each tank. Each tank boundary also includes a fill connection, strainer and associated piping. From each tank a supply line leads to the associated diesel fire pump engine and an excess fuel line from each engine returns to the tank.

Interfacing Systems

Not included in the Fuel Oil System license renewal scoping boundaries are the following interfacing system, which is separately evaluated as license renewal system:

- Fire Protection System

System Intended Functions

This system contains components which perform functions credited for Fire Protection (FP).	10CFR 54.4(a)(3)

UFSAR References

- Section 9.5.1

License Renewal Drawings

- PID-1-FO-LR20938
- PID-1-FP-LR20266

Table 2.3.3-17 Fuel Oil System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Filter Element	Filter
Flame Arrestor	Pressure Boundary
Piping and Fittings	Pressure Boundary
Tank	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-17, Summary of Aging Management Evaluation - Fuel Oil System.

2.3.3.18 Fuel Storage Building Air Handling System

System Description

The normal heating and ventilation subsystem is comprised of filters, dual purpose chilled water cooling/hot water heating coils for summer cooling or winter heating, supply air fans, chillers and a ducted distribution system with parallel-path supply dampers which are a part of the Primary Auxiliary Building Ventilation System. A hot water unit heater system, which is supplied with hot water from the Primary Auxiliary Building Hot Water Heating System, is also provided. The system is designed to maintain inside design temperatures suitable for equipment and personnel.

The ventilation function is provided by the Fuel Storage Building Ventilation System. The heating function is provided by the Hot Water Heating System and is evaluated separately.

The normal heating and ventilation subsystem employs two slotted exhaust intake hoods designed to sweep the pool surface in order to capture the dilute vapors emanating from the spent fuel pool. The entrained air and vapor are ducted to a vane axial fan, normal ventilation exhaust air isolation damper and from there to the unit plant vent.

Two basic modes of air handling are available, as discussed below. For all modes, the operation of the mechanical equipment is controlled and monitored from the plant unit control room.

Normal Once-Through Supply Exhaust Ventilation Mode:

During normal operation, filtered outside air is circulated through the Fuel Storage Building by the normal ventilation system, with the exhaust air discharged from the building via the unit plant vent. Filtering of the exhaust air is not normally performed.

Fuel Handling Mode:

The fuel handling mode is used any time irradiated fuel not in a sealed cask is handled. In the fuel handling mode of operation, the normal Building Exhaust System is isolated prior to initiation of fuel handling operations by closing the normal exhaust isolation damper and stopping the normal exhaust fan. The Fuel Storage Building is maintained at a negative pressure of 0.25" w.g. or more (negative). This is achieved by exhausting air from the building at a higher rate than directly supplied from the PAB Supply Air System. Maintaining the building at a negative pressure will minimize, or eliminate, the leakage of radioactive material to the environment in the event of an accident. The exhaust filter trains are redundant, with one unit required to operate in the event of an accident.

The redundant filter units and their respective components are fed from independent power sources so that no single failure would prevent the obtaining and maintaining of the negative pressure. The static pressure control for the parallel supply system dampers are provided with manual override provisions to allow the operator to control the damper position and the building pressure if required.

The Fuel Storage Building Emergency Air Cleaning System is a seismic Category I, Safety Class 3 system.

In-Scope Boundary Description

Fuel Storage Building Air Handling
PID-1-MAH-LR20495, PID-1-MAH- LR20497, PID-1-WLD-LR20220:

Fuel Storage Building Air Handling system boundary begins with ducting in the Primary Auxiliary Building at a support anchor, enters the Containment Enclosure Ventilation Area through a fire damper, and continues through a parallel set of dampers to a fire damper, and to a tornado damper in the Fuel Storage Building. This portion of the boundary ends at a ducting support anchor.

The boundary continues on building elevation 64’ at the inlets to two air cleaning units including the moisture separators, heaters, roughing filters, HEPA filter, Charcoal filter, HEPA filter , standby cooling crossover duct, and back draft damper. The 1-FAH-F-41 filter outlet boundary leads to a fan, discharge duct and tornado damper, ending at a duct support. The 1-FAH-F-74 filter unit outlet boundary leads to a fan and discharge duct damper. The boundary joins with the duct from the normal exhaust fan and damper to pass through a tornado damper, and ends at a duct support at building exit. Filter demister drains lead from each filter and end at a local floor drain on the 64’ elevation.

Interfacing Systems

Not included in the Fuel Storage Building Air Handling System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Primary Auxiliary Building Air Handling System
- Waste Processing Liquid Drains System

System Intended Functions

Provide a negative pressure within the fuel service building to limit unmonitored radioactive release to the environment.	10 CFR 54.4(a)(1)
Remove and retain airborne particulates and radioactive iodine following a fuel handling accident.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 3.3.2.1
- Section 6.5.1
- Section 9.4.2

License Renewal Drawings

- PID-1-MAH-LR20495
- PID-1-MAH-LR20497
- PID-1-WLD-LR20220

Table 2.3.3-18 Fuel Storage Building Air Handling System Components Subject to Aging Management Review

Component Type	Intended Function
Damper Housing	Fire Barrier Pressure Boundary Structural Integrity (Attached)
Ducting	Pressure Boundary Structural Integrity (Attached)
Ducting Closure Bolting	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Pressure Boundary
Flexible Connector	Pressure Boundary
Piping and Fittings	Pressure Boundary Leakage Boundary (Spatial)
Valve Body	Pressure Boundary Structural Integrity (Attached)

The aging management review results for these components are provided in Table 3.3.2-18, Summary of Aging Management Evaluation - Fuel Storage Building Air Handling System.

2.3.3.19 Hot Water Heating System

System Description

The Hot Water Heating System includes the station designated Hot Water Supply and Hot Water Return Systems. In addition to providing heating to buildings not within the License Renewal boundary, such as the Administration Building, Turbine Building and Waste Process Building, the Hot Water Heating System provides the functions described below.

Fuel Storage Building normal heating is comprised of filters, dual purpose chilled water cooling/hot water heating coils for summer cooling or winter heating, supply air fans, chillers and a ducted distribution system with parallel-path supply dampers which are a part of the Primary Auxiliary Building ventilation system. A hot water unit heater system, which is supplied with hot water from the Primary Auxiliary Building hot water heating system, is also provided. The system is designed to maintain inside design temperatures suitable for equipment and personnel.

Primary Auxiliary Building heating is maintained in the winter by heating the outside air with a bank of dual purpose chilled water cooling and hot water heating coils. The water temperature for the main hot water heating coils is controlled by thermostats mounted in the Primary Auxiliary Building. The heating coils are supplied with hot water/glycol from a closed loop parallel pump circulating system utilizing a common steam/hot water converter. The closed loop circulating system for the main heating coils is comprised of three pumps, one for each bank of heating coils and one reserve pump, each manually controlled locally. Each pump once started runs continuously. Certain rooms contain a pair, or pairs of unit heaters connected to thermostats located in the room which will operate the unit heater fans to maintain the room temperature above minimum design requirements. The unit heaters are supplied with hot water/glycol from a closed loop system using the same steam/hot water converter as the Primary Auxiliary Building main hot water heating coils. One centrifugal pump provides circulating water to all of the unit heaters within each room. The pump is started manually from the main control panel and runs continuously.

Heating for the Diesel Generator Building is provided by hot water unit heaters. Four unit heaters are located in each Diesel Generator area. Each of the two area heating systems is provided with hot water from the hot water/steam converter. Three hot water circulating pumps, one for each area and the third, a standby for both, are energized from the local control panel and will run until the operator manually stops them. Operation of the unit heaters is thermostatically controlled. The hot water heating piping is contained or shielded where they pass over safety-related electrical equipment.

Cable Spreading Room ventilation system supply air is reheated, when required, by a hot water heating coil in the supply ductwork to offset building heat losses. The cable spreading room ventilating system obtains makeup air and hot water for heating from the switchgear area and battery rooms heating and ventilating system.

In the winter the 4-kV switchgear areas, cable spreading area and the electrical tunnel area air is recirculated and mixed with preheated outside air, as necessary, for makeup and to maintain the inside design temperature. The 4-kV switchgear areas and battery rooms have two ventilation equipment rooms, one for each train. The equipment rooms serve as a return air/makeup air mixing plenum. The heat required to offset building heat loss from the switchgear areas, battery rooms and electrical tunnels is supplied by hot water unit heaters located in the equipment rooms. Water line breaks or hot water system failures will not affect the operation of the switchgear areas or battery rooms.

The Emergency Feedwater Water Pump House heating system is designed to maintain the pumphouse at or above 50°F when the outside temperature is 0°F or above. The heating system consists of a shared steam/hot water converter, two 100 percent capacity pumps, a piping system and two 100 percent capacity unit heaters. The heating medium is a mixture of water and glycol in a closed loop circulating system. The glycol acts to prevent freezing should the steam supply, electrical power source or a pump or driver fail. Each unit heater is controlled by its own room thermostat.

The pump room area of the Service Water Pump House is maintained at 50°F or above when the outside temperature is 0°F or above by a hot water heating system using unit heaters. Hot water is pumped through the unit heaters from a steam-to-hot-water heat exchanger located in the adjacent Circulating Water Pump House. The heating system is not required to maintain operation of the service water pumping equipment.

In-Scope Boundary Description

The Primary Auxiliary Building and Fuel Storage Building
PID-1-HW-LR20051, PID-HW-LR20056, PID-1-MAH-LR20507:

The Primary Auxiliary Building and Fuel Storage Building portion of the Hot Water Heating System boundary consists of three conjoined loops.

The Hot Water Heating System boundary for the Primary Auxiliary Building heating portion begins with three pumps in parallel discharging to two headers supplying ten water-to-air heat exchangers for the Primary Auxiliary Building. The pump discharge headers also connect to boundary piping connecting to the Primary Auxiliary Building chilled water system supply ending at 1-PAH-V-

16. Each of the ten heat exchangers has a continuous vent with the piping from the vents combining in a single line returning to the common header. The heat exchanger outlet boundary piping combines in two headers passing through a temperature control bypass valve and to the auxiliary steam heat exchanger and returning to the pump common suction or directly to the common suction. The three pumps share two air separators in a swing pump configuration to complete the loop.

The Primary Auxiliary Building filter room boundary begins with a single pump discharging to four unit heaters supporting the Primary Auxiliary Building filter room. Return flow from the unit heaters joins the returning piping from the Primary Auxiliary Building heat exchangers, passes through the auxiliary steam heat exchanger and returns to the pump suction via an air separator to complete the loop.

The Fuel Storage Building boundary begins with a single pump discharging to nine unit heaters located in the Fuel Storage Building. Return flow from the unit heaters joins the returning piping from the Primary Auxiliary Building heat exchangers, passes through the auxiliary steam heat exchanger and returns to the pump suction via an air separator to complete the loop.

The three loop boundaries above are connected by the air separator vent lines to two expansion tanks operated in parallel with a small service air overpressure. A chemical makeup tank and pump are included in the boundary to provide makeup for system leakage.

Diesel Generator and Control Building
PID-HW-LR20053:

The Diesel Generator and Control Building portion of the Hot Water Heating System boundary consists of two conjoined loops.

The control room and non-essential switchgear room heating system boundary begins with three pumps connected in parallel in a swing pump configuration discharging to four headers. One header connects to three unit heaters in mechanical room “A” and a second header connects to three unit heaters in mechanical room “B”. The third header boundary ends on entering the non-essential switchgear room. The last header includes a temperature control valve bypass and cable spreading room unit heater. The four return headers combine and continue to the Turbine Building where the boundary ends. The boundary begins again as the now heated water returns from the Turbine Building to the Control Building and to the pumps via a single air separator and piping (in common with the Diesel Generator Building loops).

The Diesel Generator boundary begins with three pumps connected in parallel in a swing pump configuration discharging to two headers. One header supplies four unit heaters in diesel room “A” and one supplies four unit heaters in diesel room “B”. Return flow from the unit heaters joins in the common header and likewise and continues to the turbine building where the boundary ends. The boundary begins again as the now heated water returns from the Turbine Building to the Control Building and to the pumps via a single air separator and piping (in common with the control building loops).

The two boundaries above are connected by the single air separator vent line to an expansion tank operated with a small service air overpressure. A chemical makeup tank and pump are included in the boundary to provide makeup for system leakage

Personnel Hatch Area
PID-1-HW-LR20056:

The personnel hatch area heating system boundary begins with two pumps in parallel combining in a common line supplying heated water one unit heater in the personnel hatch area, two unit heaters in the Emergency Feedwater Pump House and one unit heater in the pipe tunnel. The four return pipes join in a common line to the auxiliary steam heat exchanger and return to the common pump suction via an air separator to complete the loop. An expansion tank is included in the boundary and supplies a small service air overpressure. A chemical makeup tank and pump are included in the boundary to provide makeup for system leakage.

Circulating and Service Water Pump Houses
PID-1-HW-LR20052:

The Circulating and Service water Pump House heating system boundary is limited in scope to the five unit heaters and supply and return lines to the point at which they leave the safety related Service Water Pump House and enter the NNS Circulating Water Pump House.

Interfacing Systems

Not included in the Hot Water Heating System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam System
- Auxiliary Steam Heating System
- Instrument Air System
- Primary Auxiliary Building Air Handling System
- Waste Processing Liquid Drains System

System Intended Functions

This system has components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10CFR 54.4(a)(2)

UFSAR References

- Section 9.4

License Renewal Drawings

- PID-1-HW-LR20051
- PID-1-HW-LR20052
- PID-1-HW-LR20053
- PID-1-HW-LR20056
- PID-1-MAH-LR20507

Table 2.3.3-19 Hot Water Heating System
Components Subject to Age Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Filter Housing	Leakage Boundary (Spatial)
Heat Exchanger Components	Leakage Boundary (Spatial)
Heater Coil	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Piping Element	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-19, Summary of Aging Management Evaluation - Hot Water Heating System.

2.3.3.20 Instrument Air System

System Description

The plant compressed air function is provided by the Service Air and the Instrument Air Systems. The components from the Service Air System have been incorporated with the Instrument Air System, and the Containment Compressed Air System was evaluated with the Instrument Air System components.

The Compressed Air System consists of two subsystems: Plant Compressed Air System and the Containment Compressed Air System. Each subsystem employs redundant, oil-free compressors with associated filters, after coolers, moisture separators, air dryers, receivers and operating controls. The demands on each subsystem are divided into two separate groups:

- Pneumatic instrument and control demands which require clean dry air
- Station Service Air demands which receive undried air.

Instrument and control air distribution ring headers in the Turbine Building and branch headers to other areas are supplied with dried air from two redundant Instrument Air headers. The supply lines to each Instrument Air ring header are provided with an isolation valve and a check valve. In this manner, failure of a single Instrument Air header will not eliminate the air supply, and should prevent unnecessary plant transients due to accidents or maintenance of the Instrument Air System.

The pneumatic devices of various systems are divided into two categories as follows:

- Critical pneumatic devices which would directly or indirectly cause a turbine trip, reactor trip, containment isolation or equipment damage are individually fed from both Instrument Air loops (A and B) through separate check valves.
- For pneumatic devices in systems where dual paths are available (e.g., backup valves in parallel or alternate paths), one set of devices is fed from loop A, and the other set from loop B.

Pneumatic devices in safety class systems are designed to fail in the safest position upon loss of air. However, in a few instances it is desirable to maintain pneumatic control for modulating valves or time is available for operator action. In these instances, high-pressure gas bottles are provided for backup to the Compressed Air System or the equipment has provisions for manual operation.

The following devices are supplied with backup air:

- Emergency Feedwater Pump Turbine Steam Supply Valves
- Atmospheric Steam Dump Valves
- Primary Component Cooling Water Temperature Control Valves
- Primary Component Cooling Water Temperature Control Bypass Valves

The plant compressed air subsystem consists of three compressors, intake filters, after cooler / moisture separators, four air receivers, two Instrument Air dryers, associated instruments/controls, piping and valves. The above equipment is located in the south end of the Turbine Building.

Two compressors are of the air-cooled, rotary screw oil-free type. Each compressor is furnished with an air filter (dry type) at its intake and an after cooler/moisture separator on its discharge side. The compressors are piped in parallel, discharging into two air receivers. Each receiver outlet branches into two discharge lines. One line from each receiver is connected to a common header supplying Service Air to the entire unit. The other discharge line is connected to its own air drying system, which supplies one of the two redundant Instrument Air headers.

To insure a continuous supply of air for the dryers that supply the instruments and controls, air pressure is monitored. Low pressure isolates each receiver from the other and the Service Air header, thus preventing the Service Air System from bleeding down the Instrument Air supply, and increasing the independence of the two Instrument Air loops. These two rotary screw plant air compressors are connected to the emergency diesel-generator buses, making them available following a loss of offsite power.

The third compressor is also an air cooled, rotary screw oil-free type. It is furnished with an inlet air filter, an integral air-cooled intercooler and after cooler with moisture separators and a self-contained lube oil subsystem. The compressor is aligned to discharge into two auxiliary air receivers and ultimately connects into the air compressor piping downstream of the main air receivers. This air compressor is powered from a non-safety related 480V bus which is not connected to the Emergency Diesel Generators. This compressor is not, therefore, available following a loss of offsite power.

All components such as compressors, receivers, filters and air dryers are piped and valved so they may be serviced or removed from operation without interrupting the normal air supply.

Containment Compressed Air Subsystem

This subsystem is the source of compressed air for all the pneumatic instruments, controls and general service requirements in the Containment Building. The subsystem consists of two packaged compressor units (including intake filter, after cooler/moisture separator, receiver), two Instrument Air dryers, instrument/controls, piping and valves, all located in the Containment Building. Each compressor unit discharges air to an independent air dryer. From the dryer it is piped to air ring headers, which supply dry air to each pneumatic instrument or control. Shut-off and check valves are installed in each supply line to the ring headers for isolation. The branch line from a ring header to each pneumatic device includes a valve for isolation. All components are piped and valved so they may be serviced or removed from operation without interrupting the air supply.

The Containment Compressed Air System is powered from nonsafety-related motor control centers. The containment compressors are connected to the emergency diesel generator buses, making them available following a loss of offsite power.

Cooling water to the containment air compressors is supplied by the Primary Component Cooling Water (CC) System.

In-Scope Boundary Description

Service Air
PID-1-SA-LR20650:

The Service Air portion of the boundary begins with the two Service Air compressors 1-SA-SKD-137A and 1-SA-SKD-137B including the contained air and oil hydraulic piping. The boundary continues with the discharge piping of the two compressors which join the common inlet header for the two service air receiver tanks.

A third air compressor 1-SA-SKD-137C is included in the boundary only to the extent that internal piping is pressurized up to and including the check valve at the inlet to the after-cooler, the after-cooler, the moisture separator, the piping between the two and the drain line piping equipment. This compressor is not in scope per criterion (a)(3) Appendix “R”.

The boundary includes each of the four air receiver tanks, instrumentation piping, two relief valves, automatic drain piping with drain trap and connecting piping. The outlet lines of receivers “A” and “D” combine and divide to lines supplying the Service Air system and the loop “A” Instrument Air header. The Service Air supply ends at automatic isolation valve 1-SA-V-92. The remaining two receivers are connected similarly. The outlet lines of receivers "B" and "C" combine and divide to lines supplying the Service Air system and the loop "B" Instrument Air header. The Service Air supply ends at automatic isolation valve 1-SA-V-93.

PID-1-SA-LR20652:

Included in boundary is the Service Air supply to containment. It is bounded in the West Main Steam and Feedwater Pipe Chase at two pipe anchors and continues through a containment isolation valve, the containment penetration and to a pipe anchor downstream of the containment isolation valve.

Instrument Air Dryers and Headers
PID-1-IA-LR20637:

Each of the two Instrument Air loops includes a dual vessel dryer skid including pre-filter, purge control valves, connecting piping, instrumentation and a post filter. The outlets of the air dryers supply air to the Condensate Polishing system with the boundary ending at a procedurally isolable valve. Each Instrument Air dryer outlet continues and divides into three supplies and one normally open cross connect. Supplies to procedurally isolable Turbine Building loops end at the associated isolation valve.

Turbine Building:
PID-1-IA-LR20638:

Turbine building loop "A" includes supplies to the East and West Main Steam and Feedwater Pipe Chases. A supply to the water treatment room ends with a normally closed isolation valve.

PID-1-IA-LR20639:

Turbine building loop "B" includes supplies to the East and West Main Steam and Feedwater Pipe Chases and the Generator Stator Cooling System. A supply to the water treatment room is included, continuing to and ending at a procedurally isolable valve.

PID-1-GSC-LR20108:

The boundary includes the isolation valve for the Generator Stator Cooling tank.

PID-1-FP-LR20272, PID-1-FP-LR20273:

The boundary includes the Instrument Air supply to the Fire Protection preaction valves for the Fire Protection System and the component details.

East Main Steam and Feed Water Pipe Chase
PID-1-IA-LR20644, PID-1-IA-LR20647:

Instrument Air loop “A” boundary piping enters the East Main Steam and Feedwater Pipe Chase and divides into three supplies. The Instrument Air header supplies equipment located in the emergency feedwater pump building and the Main Steam and Feedwater pipe chase. Instrument Air is also supplied to an accumulator for 1-MS-V-395. Piping to the Hydrogen recombiner room includes a normally closed isolation valve.

Instrument Air loop “B” boundary piping enters the East Main Steam and Feedwater Chase and divides into three supplies. Piping to the Circulating Water Pump House ending at a procedurally isolable valve. Piping to the hydrogen recombiner room ends at a normally closed isolation valve. Note that the 1-MS-PV-3003 and 1-MS-PV-3002 / 1-MS-V394 boundaries include the Nitrogen backup sources.

West Main Steam and Feed Water Pipe Chase
PID-1-IA-LR20638, PID-1-IA-LR20639, PID-1-IA-LR20645, PID-1-IA-LR20647:

Instrument Air loop “A” boundary piping enters the West Main Steam and Feedwater Chase and supplies the Control Building, Primary Auxiliary Building, West Pipe Chase, alternate containment supply, Radiologically Controlled Area tunnel, and Residual Heat Removal Equipment Vault 1 continuing to and ending at a procedurally isolable valve.

Instrument Air loop “B” boundary piping enters the West Main Steam and Feedwater Chase and supplies the Control Building, Primary Auxiliary Building, West Pipe Chase, alternate containment supply and Residual Heat Removal vault 2. Note that the 1-MS-PV-3004 and 1-MS-PV-3001 / 1-MS-V393 boundaries include the Nitrogen backup sources.

Control Building
PID-1-IA-LR20645, PID-1-IA-LR20646:

Instrument Air loops “A” and “B” boundary piping enter the Control Building and supply the air header to the Diesel Generator Building continuing to and ending at procedurally isolable valves.

Primary Auxiliary Building, Fuel Storage Building, Cooling Tower, Containment Enclosure Ventilation Area and Waste Processing
PID-1-IA-LR20640, PID-1-IA-LR20641, PID-1-IA-LR20642, PID-1-IA-LR20645, PID-1-IA-LR20647, PID-1-CC-LR20205, PID-1-CC-LR20211:

Instrument Air loops “A” and “B” boundary piping enter the Primary Auxiliary Building and continue to the Fuel Storage Building, Cooling Tower (loop ”B” only) and Waste Process Building (loop “A” only). The loop “A” enters the

Waste Process Building continuing to and ending at a procedurally isolable valve. The loop supplies to Containment Enclosure Ventilation Area end at procedurally isolable valves.

Instrument Air loop “A” supplies Primary Component Cooling Water valves 1-CC-TV-2271-1 and -2 which includes nitrogen backup. Instrument air loop “B” supplies primary component cooling water valves 1-CC-TV-2171-1 and -2 which includes nitrogen backup.

Containment Instrument Air
PID-1-IA-LR20643, PID-1-IA-LR20645:

The boundary begins with the two Instrument Air compressor skids including the contained air and drain piping. The boundary continues with the discharge piping of the two compressors which supply their integral air receivers. The outlet of each skid continues to a loop related air dryer and to a loop cross connect and two cross train supply lines.

Each loop lists individual components supplied that include pressure retaining components and piping to the first isolation valve, as applicable. A Containment Instrument Air backup supply is included in the boundary that connects to both in-containment loops “A” and “B”.

PID-1-CC-LR20205, PID-1-CC-LR20211:

The boundary consists of components which are the air supply to valves 1-CC-TV-2171-1, 1-CC-TV-2171-2, 1-CC-TV-2272-1, and 1-CC-TV-2271-2.

PID-1-MS-LR-20580, PID-1-MS-LR20581:

The boundary consists of components which are the air supply to valves 1-MS-PV-3001, 1-MS-PV-3002, 1-MS-PV-3003, and 1-MS-PV-3004.

Interfacing Systems

Not included in the Instrument Air System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Fire Protection System
- Generator Stator Coolant System
- Main Steam System
- Primary Component Cooling Water System
- Waste Processing Liquid Drains System

System Intended Functions

Provide nitrogen as backup compressed air for critical modulating valves.	10CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10CFR 54.4(a)(3)

UFSAR References

- Section 9.3.1
- Table 7.5-1
- Table 6.2-83

License Renewal Drawings

- PID-1-CC-LR20205
- PID-1-CC-LR20211
- PID-1-FP-LR20272
- PID-1-FP-LR20273
- PID-1-GSC-LR20108
- PID-1-IA-LR20637
- PID-1-IA-LR20638

- PID-1-IA-LR20639
- PID-1-IA-LR20640
- PID-1-IA-LR20641
- PID-1-IA-LR20642
- PID-1-IA-LR20643
- PID-1-IA-LR20644
- PID-1-IA-LR20645
- PID-1-IA-LR20646
- PID-1-IA-LR20647
- PID-1-MS-LR20580
- PID-1-MS-LR20581
- PID-1-SA-LR20650
- PID-1-SA-LR20652

Table 2.3.3-20 Instrument Air System
Components Subject to Age Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Dryer Housing	Pressure Boundary
Instrumentation Element	Pressure Boundary
Filter Element	Filter
Filter Housing	Pressure Boundary
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary
Heat Exchanger Components	Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)
Pump Casing	Pressure Boundary
Tank	Pressure Boundary
Thermowell	Pressure Boundary
Trap	Pressure Boundary
Valve Body	Pressure Boundary Structural Integrity (Attached)

The aging management review results for these components are provided in Table 3.3.2-20, Summary of Aging Management Evaluation – Instrument Air System.

2.3.3.21 Leak Detection System

System Description

The Leak Detection System components monitor indications of leakage inside the Containment Building by the use of pressure, temperature, and level instruments. The system has leakage detection piping and valves, and Fuel Transfer Tube blind flange, Personnel Hatch, Emergency Hatch, and Containment pressure instrumentation at penetration X-71 and X-74.

In-Scope Boundary Description

PID-1-LD-20864:

The License Renewal scoping boundary for the Leak Detection (LD) System consists of criterion (a)(1) components which are the pressure boundary path associated with the personnel hatch, equipment hatch, fuel transfer tube, and primary containment boundary for penetrations X-71 and X-74. The criterion (a)(2) boundary consists of the non safety related components directly attached to safety related components.

Interfacing Systems

Leak Detection System does not interfere with any license renewal systems.

System Intended Functions

Provide containment isolation function.	10CFR 54.4(a)(1)
The Leak Detection System has components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Table 6.2-83

License Renewal Drawings

- PID-1-LD-LR20864

Table 2.3.3-21 Leak Detection System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Piping and Fittings	Structural Integrity (Attached) Pressure Boundary
Valve Body	Structural Integrity (Attached) Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-21, Summary of Aging Management Evaluation - Leak Detection System.

2.3.3.22 Mechanical Seal Supply System

System Description

The Mechanical Seal Supply System is designed to supply flushing water to the mechanical seals of the non-nuclear safety class pumps of the plant. The mechanical seals are provided on these pumps so that no leakage of the process fluid occurs past the shaft into the environment. For their proper functioning, the seal faces have to be kept flushed and under a minimum pressure of 15 psi higher than the process fluid pressure on the suction side of the pump. This ensures the mating of the seal faces without any particulates entrapped between them and not allowing any process fluid to enter the seal cavity (or the stuffing box).

In-Scope Boundary Description

Mechanical Seal Supply System license renewal boundary applies to both the once through demineralized water design system and the closed loop pumped design.

PID-1-DM-LR20352, PID-1-DM-LR20353, PID-1-WLD-LR20219:

The once through boundary begins at the demineralized water supply for the spent fuel skimmer pump seal flush through a pressure control valve and flow indicator to the double mechanical seal. The returning seal flush water boundary includes a flow indicator, control solenoid valve and piping of the flush water ending at a trench drain.

PID-1-DM-LR20350, PID-1-DM-LR20354, PID-1-WLD-LR20222:

The recirculation design system begins at the demineralized water supply for the seal supply tank. The tank serves as a source of makeup for the system and as a head tank. The tank has an un-valved overflow to a local drain. The boundary continues at the suction of, and through, the seal supply pump and continues at the discharge where the line divides to a 140 psig recirculation pressure control line and then continues and divides to supply the seals for the two letdown degasifier pumps. The boundary continues at the outlet of the seals where the piping joins to form a single line continuing to the heat exchanger cooled by Primary Component Cooling Water System and returns to the pump suctions to complete the boundary loop.

Interfacing Systems

Not included in the Mechanical Seal Supply System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems.

- Demineralized Water System
- Primary Component Cooling Water System
- Waste Processing Liquid Drains System

System Intended Functions

This system contains components which perform function credited for Non-Safety Affecting Safety (NSAS).	10CFR 54.4(a)(2)

UFSAR References

- None

License Renewal Drawings

- PID-1-DM-LR20350
- PID-1-DM-LR20352
- PID-1-DM-LR20353
- PID-1-DM-LR20354
- PID-1-WLD-LR20219
- PID-1-WLD-LR20222

Table 2.3.3-22 Mechanical Seal Supply System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Heat Exchanger Components	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-22, Summary of Aging Management Evaluation - Mechanical Seal Supply System.

2.3.3.23 Miscellaneous Equipment

System Description

Miscellaneous Equipment contains the hydraulic piping and components that operates the personnel hatch doors for entry into containment. The hydraulic network equalizes air lock pressure, rotates the locking ring to the unlock position and opens the outer door. On close demand the network closes the door, closes the equalizing valve, rotates and locks the locking ring. Similarly, a personnel air lock hydraulic reservoir inside the containment operates with a network of control valves, piping, interlock controls and actuating pistons. The hydraulic network equalizes air lock pressure, rotates the locking ring to the unlock position and opens the inner door. On close demand the network closes the door, closes the equalizing valve then rotates and locks the locking ring.

In-Scope Boundary Description

Personnel Air Lock
PID-1-MM-LR20945:

The in scope portion of the Miscellaneous Equipment includes the personnel air lock hydraulic equipment, and the liquid filled piping and equipment required to operate the containment hatch doors.

Interfacing Systems

The Miscellaneous Equipment System does not interface with any license renewal systems.

System Intended Functions

Provide Main Control Board status monitoring lights and annunciators.	10CFR 54.4(a)(1)
Provide protection and process control for Westinghouse 7300 NSSS and BOP cabinets.	10CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring)`	10CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

This system contains components which perform functions credited for Anticipated Transients Without Scram (ATWS).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-MM-LR20945

Table 2.3.3-23 Miscellaneous Equipment
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Flexible Hose	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-23, Summary of Aging Management Evaluation - Miscellaneous Equipment.

2.3.3.24 Nitrogen Gas System

System Description

The function of the Nitrogen Gas System is to supply nitrogen at controlled pressures to various locations in the unit for:

- Pressurizing the safety injection accumulators
- Inerting and purging systems
- Use as a cover gas
- Used in preventing corrosion during wet and dry lay-up of components.

<u>The Nitrogen Gas System supplies the following major Systems/Components:</u>

Safety Injection accumulators, Waste Processing Liquid Drains System's reactor coolant drain tank, Reactor Coolant System's primary relief tank, Waste Gas System, Vent Gas System, Release Recovery System Tanks, Chemical and Volume Control System's volume control tank and letdown degasifier, Resin Sluice System Tanks, Reactor Makeup Water Tank, Main Steam System, Boron Recovery System's primary drain tanks and degasifier, and Steam Generator Blowdown System.

In-Scope Boundary Description

Volume Control Tank and Letdown Degasifier
PID-1-NG-LR20135, PID-1-RMW-LR20360, PID-1-VSL-LR20775:

The Nitrogen Gas system boundary associated with the volume control tank begins with a support anchor on the Nitrogen Gas supply to the Volume Control tank and continues to the tank interface. The Nitrogen Gas boundary associated with the letdown degasifier begins at the first normally closed valve and continues to the tank interface. The leakage boundary for the piping from the Reactor Makeup Water System storage tank (1-RMW-TK-12), and Vent Gas System tank (1-VG-TK-108) goes to the first check valve. The boundary also includes the valve stem leak-off line from the letdown degassifier nitrogen control valve to the Valve Stem Leak-off System.

Safety Injection Accumulators
PID-1-SI-LR20450, PID-1-NG-LR20136:

The Nitrogen Gas supply to the Safety Injection accumulators begins at a support outside the containment. The boundary continues through an outside containment isolation and an inside isolation. The boundary ends at a support anchor and continues again with each of the four supply lines at a support anchor. The boundary continues through the control valves and a check to the individual accumulators where the boundary ends.

Containment Nitrogen Gas Supplied Equipment PID-1-NG-LR20136, PID-1-MS-LR20580, PID-1-MS-LR20581, PID-1-RC-LR20841, PID-1-RC-LR20842, PID-1-RC-LR20843, PID-1-RC-LR20844, PID-1-RC-LR20846, 1PID-1-RMW -LR20360, PID-1-WLD-LR20218:

The Nitrogen Gas supply to the Steam Generator Blowdown, Main Steam, Reactor Coolant drain tank, and the pressure relief tank begins at an anchor outside the containment. The boundary continues through an outside containment isolation and an inside isolation. The boundary continues with the piping to the four Steam Generator Blowdown lines and two of the four Main Steam headers where this portion of the boundary ends.

The supply to the remaining two Steam Generators, Reactor Coolant drain tank, and the primary relief tank begin at an anchor on the Main Steam supply and end at the Main Steam header. The supply for the Reactor Coolant Drain Tank begins at the last check valve in line and continues to the vent header for the Reactor Coolant drain tank. The supply for the pressure relief tank begins at the last check valve in line and continues to the pressure relief tank where the boundary ends.

Relief Recovery Tank PID-1-RR-LR200061:

The supply for the Relief Recovery tank begins at the last check valve ending at the relief header for the tank.

Interfacing Systems

Not included in the Nitrogen Gas System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems.

- Chemical and Volume Control System
- Main Steam System
- Reactor Coolant System
- Reactor Makeup Water System
- Relief Recovery System
- Safety Injection System
- Steam Generator Blowdown System

- Vent Gas System
- Valve Stem Leak-off System
- Waste Gas System

System Intended Functions

Provides Safety Injection accumulator overpressure.	10 CFR 54.4(a)(1)
This system has components that blanket and purge miscellaneous equipment.	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.3.4
- Table 6.2-83

License Renewal Drawings

- PID-1-NG-LR20135
- PID-1-NG-LR20136
- PID-1-MS-LR20580
- PID-1-MS-LR20581
- PID-1-RC-LR20841
- PID-1-RC-LR20842
- PID-1-RC-LR20843

- PID-1-RC-LR20844
- PID-1-RC-LR20846
- PID-1-RMW-LR20360
- PID-1-RR-LR20061
- PID-1-SI-LR20450
- PID-1-VSL-LR20775
- PID-1-WLD-LR20218

Table 2.3.3-24 Nitrogen Gas System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Flexible Hose	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)

The aging management review results for these components are provided in Table 3.3.2-24, Summary of Aging Management Evaluation - Nitrogen Gas System.

2.3.3.25 Oil Collection For Reactor Coolant Pumps System

System Description

The seismically designed lube oil collection system for the four Reactor Coolant pumps has been designed with two collection tanks, with two pumps draining to each tank. Each of the two tanks has been sized to contain 125 percent of the oil inventory of one pump. A seismically designed dike has been provided around each tank. Each tank in combination with its associated dike has been sized to contain the entire inventory of two pumps. The tanks and the dikes have been located so that the excess oil does not present a fire hazard to any safety-related equipment. Additionally, there is no ignition source near the diked area.

In-Scope Boundary Description

PID-1-OC-LR20180:

The license renewal boundary for Oil Collection for Reactor Coolant Pumps (OC) System begins with oil collection tanks enclosures and drip pans on each of the four Reactor Coolant pumps. The boundary includes the flex hoses and piping to the two oil collection tanks. Each tank services two Reactor Coolant pumps. The tank boundary includes the tank, drain line, valve, and the vent line including the flame arrestor.

Interfacing Systems

The Oil Collection for Reactor Coolant Pumps System does not interface with any license renewal systems.

System Intended Functions

This system contains components which perform functions credited for Fire Protection (FP).	10CFR 54.4(a)(3)

UFSAR References

- Section 9.5.1.3

License Renewal Drawings

- PID-1-OC-LR20180.

Table 2.3.3-25 Oil Collection for Reactor Coolant Pumps System Components Subject to Age Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Drip Pan	Pressure Boundary
Flame Arrester	Pressure Boundary
Flexible Hose	Pressure Boundary
Piping and Fittings	Pressure Boundary
Tank	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-25, Summary of Aging Management Evaluation - Oil Collection for Reactor Coolant Pumps System.

2.3.3.26 Plant Floor Drain System

System Description

The floor drains in this system are located outside any area with a potential for contamination. The Plant Floor Drain system is located in those areas where automatic sprinkler and spray systems are installed. These drains are sized to pass the expected flows resulting from automatic system actuation, as well as that produced by manual hose application if employed. In areas where hand hose lines are the only water sources utilized to combat a fire, drains are provided if accumulation of fire fighting water could result in unacceptable damage to safety-related equipment in the area. In such areas, the operator can use the hose to control the quantity of drain water to avoid unacceptable damage to equipment.

Drainage within the Diesel Generator Building is designed to prevent the spread of fire from one area to another. Other areas with combustible liquids have normally closed shut-off valves in the drain lines or drain directly to the oil/water separation vault.

The electrical tunnels contain no sources of flood water other than the Fire Protection System piping. The Fire Protection System piping are zoned pre-action dry pipe systems with the zone valves located external to the tunnel areas. The individual Fire Protection System zones will be actuated by ionization fire detectors. Fire detectors are provided in the areas zoned to provide for local indication and for an audible and visual alarm in the control room and the guardhouse. Water from the fire protection system will be drained from the tunnel zones to a sump external to the electrical tunnel areas (located in Emergency Feed Water Pump House). Redundant pumps have been installed in the sump to pump the water collected from the tunnel to the Storm Drain System (not in scope of license renewal).

Failure of a Circulating Water System expansion joint in the Turbine Building will flood the ground floor pit east of the condensers in the Turbine Building. Assuming the worst possible failure to be a 2" gap all around, the pit would fill up in about 3 minutes, unless prompt action by the operator is taken. There are two level switches (1-DR-LSH-5984 and 5985) in the condenser pit that provide sequential alarms in the control room to warn the operator of the flooded condition. No loss of offsite power is induced by a failure of this equipment provided operator action is taken within 22.2 minutes to mitigate the consequences of the flood.

In-Scope Boundary Description

Control Building
PID-1-CBA-LR20303:

The control building air handling portion of the Plant Floor Drain System boundary begins with a sump pump installed in the yard control room air intake structure and includes the discharge piping and check valve ending as the line continues to a local catch basin.

West Main Steam and Feedwater Pipe Chase
PID-1-DF-LR20200, PID-1-DR-LR20633, PID-1-SD-LR20402:

The West Main Steam and Feedwater floor drain portion of the system begins with the discharge piping of the two west pipe chase pumps as they exit the sump. The pipes continue through two check valves, isolation valves and connected drain valves to join in a single line continuing to the Emergency Feedwater Pump House roof where the boundary joins the roof drain system. The boundary ends as the piping exits the building and enters the storm drain system.

Emergency Feedwater Pump House
PID-1-DF-LR20194, PID-1-DF-LR20195:

The Emergency Feedwater Pump House floor drain portion of the system begins on elevation 27’ with seven drains, two cleanouts and a connection from main steam drains. The piping joins to form a single line and continues, with three yard cleanout connections, to oil/water separator vault number one. The boundary continues through an isolation valve and the oil/water separator ending at the water holding tank.

East Main Steam and Feedwater Pipe Chase
PID-1-DF-LR20200, PID-1-SD-LR20402:

The East Main Steam and Feedwater Pipe Chase portion of the system begins with the discharge piping of the two east pipe chase pumps as they exit the sump. The pipes continue through two check valves, isolation valves and connected drain valves to join in a single line continuing to the yard storm drains where the boundary ends.

Intake and Discharge Transition Structures
PID-1-DF-LR20200:

The Intake and Discharge Transition Structure portions are similar, each beginning with the piping as it exits the sump and includes a check and isolation valve and piping ending as it exits the building’s exterior wall.

Electrical Tunnels
PID-1-DF-LR20200, PID-1-SD-LR20402:

The boundary for the electrical tunnels begins with the floor drain hubs located at elevations 0’, (-)20’ and (-)26’. The drains join in four lines and empty into the electrical tunnel sump. The boundary continues with the two sump pumps and discharge pipes through two check valves, isolation valves and connected drain valves to join in a single line continuing through the Emergency Feedwater Pump House and continuing to the yard storm boundary where the boundary ends.

Diesel Generator Building
PID-1-DF-LR20196:

The Diesel Generator Building portion of the boundary includes two floor drains in the fuel oil day room and one outside the room at elevation 51’ 6” that join to form two lines with check valves each ending in the associated train’s elevation (-)16’ floor trench. Each train elevation 21’ 6” trench also drains via associated piping and check valve to the train’s elevation (-) 16’ floor trench. Each train sump pump and suction pipe from the exit of the sump is included in the boundary. The boundary continues with the sump pumps discharge lines with branches to instrumentation, vent, relief and emergency discharge connections. The boundary ends as the pipes leave the building and enter the yard.

Interfacing Systems

Not included in the Plant Floor Drain System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Main Steam System
- Feedwater System
- Potable Water System
- Roof Drain System
- Demineralized Water
- Dewatering System

System Intended Functions

Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Appendix A, Section F.3, Page 41

License Renewal Drawings

- PID-1-CBA-LR20303
- PID-1-DF-LR20194
- PID-1-DF-LR20195
- PID-1-DF-LR20196
- PID-1-DF-LR20200
- PID-1-DR-LR20633
- PID-1-SD-LR20402

Table 2.3.3-26 Plant Floor Drain System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary
Tank	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-26, Summary of Aging Management Evaluation - Plant Floor Drain System.

2.3.3.27 Potable Water System

System Description

Potable water received from the town of Seabrook water main is metered at the Fire Pump House then piped to the fire water storage tanks and the plant distribution system. The fire protection tank fill line is equipped with a backflow preventer. Chlorine injection is provided for control of biological growths in the fire protection tanks and associated piping. The Water Treatment Makeup System uses the undedicated 200,000-gallon capacity of each fire water storage tank as its source of makeup water. The system is not safety related and is not relied on to perform a safety related function.

The distribution system consists of branch mains to the various personnel areas, Service Water Cooling Tower fill, the Demineralized Water Makeup System and the fire water storage tank fills. Branch headers and branches lead to the various fixtures. Drinking fountains, eye and face wash fountains, lavatories, urinals, water closets, showers, safety showers, water coolers, water heaters, and special fixtures are provided according to occupancy. Connections are provided to kitchen, laboratory and similar equipment requiring potable water. The branch main to personnel areas is equipped with a backflow preventer and hose bib vacuum breakers to prevent backflow or siphoning.

In-Scope Boundary Description

Control Building Air Handling
PID-1-CBA-LR20303:

Potable Water supplies two Control Building Air Handling System loop seal fill supply lines

Control and Diesel Generator Building
PID-1-PW-LR20916:

The Control and Diesel Generator Building portion of the Potable Water system boundary begins as the header enters the Diesel Generator Building and branches to supply three hose connections, and two Control Building Air Handling System loop seal fill supply lines. The boundary continues as the header enters the Control Building and branches to supply two hose connections, two humidifiers, a vent, shock arrestor, water heater, refrigerator, water purifier, the men’s and women’s restrooms and the kitchen sink.

Radiologically Controlled Area Tunnel, Primary Auxiliary Building, 21 Foot Control Building
PID-1-PW LR20919: PID-1-LR20918: PID-1-DF-LR20200

The Radiologically Controlled Area tunnel portion of the Potable Water System boundary begins as the header enters the tunnel from the Administration Building and branches to seven hose connections and an unused connection to a sanitary facility. The boundary continues with piping to the instrument and controls hot shop, through the Radiologically Controlled Area check point and to a hose connection in the personnel hatch area. Another branch connection from the tunnel header supplies a hose connection in the Emergency Feedwater Pump House. Another branch from the tunnel header enters the Control Building and divides to include eyewash station supplies in train “A” and “B” Essential Switch Gear Rooms and two shock arrestors and hose connections. A Potable Water hose connection in the Service Water Pump House and a flush supply to the Electrical Tunnels sump are included in the boundary.

Interfacing Systems

Not included in the Potable Water System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Control Building Air Handling System
- Diesel Generator System
- Plant Floor Drain System

System Intended Functions

This system contains components that perform functions credited for Non-Safety Affecting Safety (NSAS).	10CFR 54.4(a)(2)

UFSAR References

- Section 9.2.4

License Renewal Drawings

- PID-1-CBA-LR20303
- PID-1-DF-LR20200
- PID-1-PW-LR20916
- PID-1-PW-LR20918
- PID-1-PW-LR20919

Table 2.3.3-27 Potable Water System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Heater Housing	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-27, Summary of Aging Management Evaluation - Potable Water System.

2.3.3.28 Primary Auxiliary Building Air Handling System

System Description

The function of the normal Heating and Ventilating System for the Primary Auxiliary Building is to provide sufficient circulation of filtered outside air for removal of heat generated by lighting and equipment in the summer, and to offset building heat losses in the winter, in rooms and areas of the Primary Auxiliary Building. The Primary Auxiliary Building Ventilation and Heating System [Primary Auxiliary Building Air Handling (PAH)] System also supplies conditioned air to the Fuel Storage Building and makeup to the containment enclosure area. Under normal operating conditions, the charging pump rooms are exhausted through this heating and ventilating system.

The ventilation function is provided by the Primary Auxiliary Building Air Handling System. The heating function is provided by the Hot Water Heating System and is evaluated separately. The normal heating and ventilating system, equipment and ductwork is non-seismic Category I and has no safety classification, with the following exceptions: the ductwork passing through the containment enclosure providing conditioned air to the Fuel Storage Building, the containment enclosure makeup air and exhaust air isolation dampers, and the exhaust ductwork from the charging pump rooms are all seismic Category I, Safety Class 2. The Primary Component Cooling Water pump area and the boron injection equipment area are provided with a Safety Class 3, seismic Category I ventilation system for emergency use should the normal ventilation system not be available.

In-Scope Boundary Description

Primary Auxiliary Building Cleanup Filter
PID-1-MAH-LR20494:

The in-scope boundary consists of safety system related components which are the Primary Auxiliary Building Air Handling System tornado dampers. The boundary for the non-safety related components is the non safety related ductwork connected to the safety related tornado dampers and the air cleaning unit 1-PAH-F-16 housing.

Primary Auxiliary Building and Containment Enclosure Ventilation Area
PID-1-MAH-LR20495:

This consist of safety related components which are the Primary Auxiliary Building Air Handling System tornado dampers, and the components that comprise the safety related flow path to and from the Containment Enclosure Ventilation Area along with components that provide flow path associated with fans 1-PAH-FN-42A & B. The non-safety related boundary consists of the non safety related ductwork attached to the safety related ductwork. The criterion (a)(3) boundary consist of the Primary Auxiliary Building Air Handling System fire dampers and components that are also the same components that are included in the safety related boundary.

Primary Auxiliary Building Air Handling
PID-1-MAH-LR20496:

The boundary consist of criterion (a)(3) components which are the Primary Auxiliary Building Air Handling System fire dampers.

Chilled Water
PID-1-MAH-LR20507:

The chilled water portion of the Primary Auxiliary Building Air Handling System boundary begins with the interface to Hot Water Heating System and continues through the air separator and divides to supply the two suctions of the Primary Auxiliary Building Air Handling System chilled water pumps. The boundary continues through the two pumps combining in a single line and ending at the lines exit from the Primary Auxiliary Building to the Waste Process Building roof. The boundary continues as the return chilled water line enters from the roof into the Primary Auxiliary Building. The piping then continues to a temperature control valve and bypass line with a recirculation line to the inlet of the air separator. The boundary ends at the interface with the Hot Water Heating System.

Interfacing Systems

Not included in the Primary Auxiliary Building Air Handling System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Containment Enclosure Air Handling System
- Containment Online Purge System
- Hot Water Heating System
- Waste Processing Liquid Drains System

System Intended Functions

Isolate the Containment Enclosure Ventilation Area (CEVA), in the event of a loss of coolant accident, LOCA, or failure of the Primary Auxiliary Building supply/exhaust system.	10 CFR 54.4(a)(1)

Provide additional cooling to the Primary Component Cooling Water pump area to maintain area design temperature.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide pressure relief protection in the event of a tornado (Tornado Dampers).	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.4.3
- Section 3.3

License Renewal Drawings

- PID-1-MAH-LR20494
- PID-1-MAH-LR20495
- PID-1-MAH-LR20496
- PID-1-MAH-LR20507

Table 2.3.3-28 Primary Auxiliary Building Air Handling System Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Damper Housing	Fire Barrier Pressure Boundary
Ducting	Pressure Boundary Structural Integrity (Attached)
Ducting Closure Bolting	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Leakage Boundary (Spatial) Structural Integrity (Attached)
Flexible Connector	Pressure Boundary
Piping and Fittings	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-28, Summary of Aging Management Evaluation - Primary Auxiliary Building Air Handling System.

2.3.3.29 Primary Component Cooling Water System

System Description

The Primary Component Cooling Water System supplies flow to the following safeguard components which are required for safe shutdown and/or to ameliorate the consequences of an accident:

- Containment Building Spray pumps
- Containment Building Spray heat exchangers
- Residual Heat Removal pumps
- Residual Heat Removal heat exchangers
- Safety Injection pumps
- Centrifugal charging pumps
- Containment enclosure coolers

The system serves as an intermediate fluid barrier between the Reactor Coolant and Service Water Systems assuring that leakage of radioactive fluid from the components being cooled is not released to the environment.

The Primary Component Cooling Water System consists of loops A and B which are two independent and redundant flow loops and a Reactor Coolant Pump Thermal Barrier loop. Loops A and B each supplies component cooling water to one of the redundant components performing engineered safeguard functions to the Reactor Coolant Pump Thermal Barrier loop, and to other non-safeguard loads.

A supply and return cross connect and a Primary Component Cooling Water head tank outlet line cross connect are included in the system design. Each cross connect consists of two isolation valves. These valves are locked closed when two independent Primary Component Cooling Water trains are required to be operable in accordance with plant Technical Specifications.

The Reactor Coolant Pump Thermal Barrier loop is designed to provide 100 percent of the cooling capacity required to cool the Reactor Coolant Pump Thermal Barrier cooling coils under all normal plant operating conditions. The Reactor Coolant Pump Thermal Barrier loop has been classified as nonessential, but it incorporates the following special design features to provide a high degree of reliability:

a. Primary Component Cooling Water loops A and B each provide cooling to the Reactor Coolant Pump Thermal Barrier loop.

b. Pipe supports and pressure-retaining system components are designed in accordance with ASME III Safety Class 3 and Seismic Category I requirements.

c. Flow instrumentation trains to the annunciator, pumps, pump drive motors, and associated controls are redundant, are qualified to 1E requirements, and are designed to operate with power from the Diesel Generators in the event of a loss of offsite power.

d. Instrument sensing lines are designed in accordance with the requirements of ISA Standard 67.02-1980.

Those portions of the Primary Component Cooling Water System which furnish cooling water to safeguards components are designated Safety Class 3, seismic Category I, and are located in seismic Category I structures. The cross connects are designated Safety Class 3, Seismic Category I and are located in Seismic Category I structure.

To provide increased reliability for cooling safety-related components, a cross connect from the Fire Protection and Demineralized Water Systems to the Primary Component Cooling Water System is included in the System design. This cross connect can be used to provide cooling water to the charging pump lube oil coolers or provide emergency makeup water to safety-related portions of the Primary Component Cooling Water system. This cross connect is backed up by a seismic Category I Service Water System and booster pump makeup source.

Those portions of the Primary Component cooling Water System which are non-seismic Category I portions of the system are isolated in the event of a leak. The isolation valves will close on a Primary Component Cooling Water Head Tank low level alarm. Thus, the system safety function is not compromised in the event of a leak in the non-safety portion of the system.

In-Scope Boundary Description

Primary Component Cooling Water (CC) System Loop A
PID-1-CC-LR20205, PID-1-CC-LR20206, PID-1-CC-LR20207, PID-1-CC-LR20208, PID-1-DM-LR20350, PID-1-FP-LR20268, PID-1-IA-LR20643:

The boundary piping for the Primary Component Cooling Loop A begins at the suction of the two Primary Component Cooling Water pumps and continues through pump discharge check valves and isolation valves to a common line. Flow is then directed to the Primary Component Cooling Water heat exchanger and bypass line. The boundary piping then divides into five branches. A flow nozzle is located in the discharge line before the second and third branches.

The first branch includes supply and return lines for the containment enclosure cooling coils, spent fuel heat exchanger, charging pump oil cooler, charging pump backup fire water cooling supply valve and piping, backup demineralized water supply valve and piping, outside backup cooling discharge valve and piping, and the post accident sample heat exchanger.

The second branch includes supply and return lines for the, letdown heat exchanger, seal water heat exchanger, four steam generator sample coolers, two pressurizer sample coolers, two Reactor Coolant System loop sample coolers, letdown degassifier trim cooler, degassifier hot well condenser and seal supply heat exchanger.

The third branch includes supply and return lines for the containment components isolated by “P” signal actuated supply and return valves. This includes the three containment structure cooling units, containment service air compressor, two Reactor Coolant pumps, Reactor Coolant drain tank heat exchanger, Containment Building Spray heat exchanger, Containment Building Spray pump seal cooler, Residual Heat Removal pump seal cooler, Residual Heat Removal heat exchanger and the Safety Injection pump seal cooler. The supply and return for thermal barrier heat exchanger are off this branch but have no automatic isolation.

The fourth branch includes supply and return lines for the system radiation monitoring unit.

The fifth branch includes supply and return lines for the cross train connect lines. Each branch return path ends in a common line, and then divides into two lines continuing to an isolation valve and to the respective component cooling pump suction. A head tank suction line connection and head tank is included in the boundary as is a normally isolated recirculation line to the head tank from the pump discharge line.

The Waste Processing Building has no safety related components or piping hence the supply piping boundary terminates on entry to the Waste Process Building and begins again as the return piping exits the Waste Process Building.

Primary Component Cooling Water Loop B
PID-1-CC-LR20211, PID-1-CC-LR20212, PID-1-CC-LR20213, PID-1-CC-LR20214, PID-1-CC-LR20215, PID-1-FP-LR20268, 1-PID-IA-LR20643:

The boundary piping for the Primary Component Cooling Water Loop B begins at the suction of the two Primary Component Cooling Water pumps and continues through pump discharge check and isolation valves to a common line. Flow is then directed to the Primary Component Cooling Water heat exchanger and bypass line. The boundary piping then divides into five branches. A flow nozzle is located in the discharge line before the second and third branches.

The first branch includes supply and return lines for the containment enclosure cooling coils, Spent Fuel Pool Cooling heat exchanger, charging pump oil cooler, charging pump backup fire water cooling supply valve and piping, backup demineralized water supply valve and piping and the outside backup cooling discharge valve and piping.

The second branch includes supply and return lines for the seal water heat exchanger, steam blowdown skid, flash steam condenser/cooler, blowdown flash steam condenser, flash tank bottoms cooler 88A, flash tank bottoms cooler 88B and the Boron Thermal Regeneration System Chiller.

The third branch includes supply and return lines for the positive displacement charging pump, containment building spray heat exchanger, containment building spray pump seal cooler, residual heat removal pump seal cooler, residual heat removal heat exchanger, safety Injection pump seal cooler and the thermal barrier heat exchanger. Containment components isolated by “P” signal actuated supply and return valves are the three containment structure cooling units, two Reactor Coolant pumps, containment Service Air compressor, excess letdown heat exchanger, pressurizer relief tank heat exchanger.

The fourth branch includes supply and return lines for the radiation monitoring unit.

The fifth branch includes supply and return lines for the cross connect lines.

Each branch return path combines in a common line, and then divides into two lines continuing to an isolation valve and to the respective component cooling pump suction. A head tank suction line connection and head tank is included in the boundary as is a normally isolated recirculation line to the head tank from the pump discharge line.

The Waste Processing Building has no safety related components or piping hence the supply piping boundary terminates on entry to the Waste Process Building and begins again as the return piping exits the Waste Process building.

Thermal Barrier Cooling Loop
PID-1-CC-LR20209:

Independent of loop A and B, the boundary piping for the Thermal Barrier Cooling Loop begins at the suction of the two thermal barrier pumps and continues through pump discharge check and isolation valves to a common line and normally isolated recirculation line. The boundary then continues to the two series thermal barrier heat exchangers. The boundary piping then continues to the inlet of the four Reactor Coolant Pump Thermal Barrier Coolers and continues at the cooler's outlet line and combine to form a single line returning to the head tank.

Primary Component Cooling Water Drains

PID-1-WLD-LR20219, PID-1-WLD-LR20220, PID-1-WLD-LR20222, PID-1-WLD-LR20223:

The boundary consists of non-safety related components which are the drain piping that interfaces with the Waste Processing Liquid Drains System.

Letdown Degassifier Mechanical Seal Supply Heat Exchanger
PID-1-DM-LR20354:

The boundary consists of the non-safety related components which are the supply and return piping to Mechanical Seal Supply heat exchanger for the letdown degasifier recirculation pumps.

Interfacing Systems

Not included in the Primary Component Cooling Water System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Containment Air Handling System
- Containment Building Spray System
- Containment Enclosure Air Handling System
- Chemical and Volume Control System
- Demineralized Water System
- Instrument Air System
- Mechanical Seal Supply System
- Primary Auxiliary Building Air Handling System
- Radiation Monitoring System
- Reactor Coolant System

- Residual Heat Removal System
- Safety Injection System
- Sample System
- Service Air System (Included in Instrument Air System)
- Spent Fuel Pool Cooling System
- Steam Generator Blowdown System
- Waste Processing Liquid Drains System

System Intended Functions

Transfer safety-related heat loads to the Service Water System, including shutdown cooling.	10 CFR 54.4(a)(1)
Initiate/maintain systematic isolation of non-safety related heat loads (includes inventory control).	10 CFR 54.4(a)(1)
Provide and maintain a barrier between radioactive systems and the environment (within release limits).	10 CFR 54.4(a)(1)
Provide thermal barrier cooling, including proper loop inventory.	10 CFR 54.4(a)(1)
Initiate and maintain systematic isolation of a failed thermal barrier cooler.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS)	10CFR 54.4(a)(2)
This system contains components which perform functions credited for Anticipated Transients Without Scram (ATWS)	10CFR 54.4(a)(3)

This system contains components that perform functions credited for Environmental Qualification (EQ).	10CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10CFR 54.4(a)(3)

UFSAR References

- Section 9.2.2
- Table 6.2-83
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-CC-LR20205
- PID-1-CC-LR20206
- PID-1-CC-LR20207
- PID-1-CC-LR20208
- PID-1-CC-LR20209
- PID-1-CC-LR20211
- PID-1-CC-LR20212
- PID-1-CC-LR20213
- PID-1-CC-LR20214
- PID-1-CC-LR20215
- PID-1-DM-LR20350
- PID-1-DM-LR20354
- PID-1-FP-LR20268
- PID-1-IA-LR20643

- PID-1-WLD-LR20219
- PID-1-WLD-LR20220
- PID-1-WLD-LR20222
- PID-1-WLD-LR20223

Table 2.3.3-29 Primary Component Cooling Water System Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary
Heat Exchanger Components	Heat Transfer Pressure Boundary
Instrumentation Element	Pressure Boundary Leakage Boundary (Spatial)
Orifice	Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping Element	Pressure Boundary
Pump Casing	Pressure Boundary
Tank	Pressure Boundary
Thermowell	Leakage Boundary (Spatial) Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-29, Summary of Aging Management Evaluation - Primary Component Cooling Water System.

2.3.3.30 Radiation Monitoring System

System Description

The Radiation Data Management System [Radiation Monitoring System (RM)] consists of three subsystems: process and effluent radiation monitoring system, area radiation monitoring system, and airborne and particulate radioactivity monitoring system. The functional performance requirements for the Radiation Monitoring System are to:

- Warn of leakage from process systems containing radioactivity
- Monitor the amount of radioactivity released in effluents
- Isolate lines containing liquid and gaseous activity when activity levels reach a preset limit
- Record the radioactivity present in various station systems and effluent streams
- Provide a means for leakage detection
- Provide information on failed fuel.
- Monitor plant areas within the Radiologically Controlled Area for radiation

In-Scope Boundary Description

PID-1-CC-LR20205, PID-1-CC-LR20211, PID-1-SB-LR20626, PID-1-MAH-LR20504, and PID-1-SS-LR20521:

The in-scope portion of the Radiation Monitoring System skids includes all skid components for two Primary Component Cooling Water System radiation monitors, four Steam Generator Blowdown System liquid radiation monitors, the Steam Generator Blowdown System flash tank outlet liquid radiation monitor (and magnetite filters) and the lines to and from the containment gas monitor.

PID-1-CBA-LR20303, PID-1-MAH-LR20495, PID-1-MAH-LR20504, PID-1-MS-LR-20580, PID-1-MS-LR20581:

Other safety related Radiation Monitor instrumentation included are:

- Main Steam radiation monitors
- Control Building Air Handling air intake radiation monitors

- Containment Enclosure emergency exhaust radiation monitor
- Containment Online Purge radiation monitors
- Manipulator crane radiation monitors
- Containment post LOCA radiation monitors

Interfacing Systems

Not included in the Radiation Monitoring System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Containment Air Handling System
- Containment Enclosure Air Handling System
- Control Building Air Handling System
- Demineralized Water System
- Main Steam System
- Primary Component Cooling Water System
- Sample System
- Steam Generator Blowdown System

System Intended Functions

Provide safety related area radiation monitoring that is required in all modes of operation.	10CFR 54.4(a)(1)
Provide safety related radiation process monitoring that is used for post accident trend monitoring.	10CFR 54.4(a)(1)
Provide safety related airborne radiation monitoring associated with the control room intake and containment on-line purge.	10CFR 54.4(a)(1)
Provide airborne radiation monitoring that is used for post accident trend monitoring.	10CFR 54.4(a)(1)

This system contains components which perform functions credited for Environmental Qualification (EQ).	10CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10CFR 54.4(a)(2)

UFSAR References

- Table 7.5-1
- Section 11.5.1
- Section 12.3.4.2

License Renewal Drawings

- PID-1-CBA-LR20303
- PID-1-CC-LR20205
- PID-1-CC-LR20211
- PID-1-MAH-LR20495
- PID-1-MAH-LR20504
- PID-1-MS-LR20580
- PID-1-MS-LR20581
- PID-1-SB-LR20626
- PID-1-SS-LR20521

Table 2.3.3-30 Radiation Monitoring System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Filter Housing	Leakage Boundary (Spatial)
Heat Exchanger Components	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial) Structural Integrity (Attached)
Piping Element	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial) Structural Integrity (Attached)

The aging management review results for these components are provided in Table 3.3.2-30, Summary of Aging Management Evaluation - Radiation Monitoring System.

2.3.3.31 Reactor Makeup Water System

System Description

The function of the Reactor Makeup Water System is to provide for the storage and distribution of reactor grade water. It also provides storage capacity for water recycled by the Boron Recovery System.

The Reactor Makeup Water System consists of one reactor makeup water storage tank, two redundant, full capacity reactor makeup water pumps and associated piping, valves, instrumentation and controls. The reactor makeup water storage tank is located in an enclosure between the Primary Auxiliary Building and the Waste Processing Building. The tank is equipped with an internal floating cover to preclude the diffusion of air into the makeup water. Steam heating panels encircle each tank to provide freeze protection. Minimum water temperature is maintained at approximately 45 to 55F.

The unit has two reactor makeup water pumps. Each pump has sufficient capacity to supply the expected loads. The reactor makeup water pumps are located on the 7' 0" level of the Primary Auxiliary Building. Because the reactor makeup water pump has a drooping head characteristic at low flow, a restrictive orifice maintains a minimum recirculation flow to the reactor makeup water storage tank. This orifice is sized to allow sufficient pump flow to ensure operation at a stable point on the pump curve. A manual bypass valve at the restrictive orifice allows larger recirculation flows for tank recirculation prior to sampling.

The supply line to the Waste Process Building is controlled by a pressure reducing valve to avoid exceeding the design pressure of the equipment in the Spent Resin Sluicing and Boron Recovery Systems.

In-Scope Boundary Description

Reactor Makeup Water
PID-1-RMW-LR20360:

The Reactor Makeup Water boundary begins at the Reactor Makeup Water tank in the tank farm area. Common suction piping for the two Reactor Makeup Water pumps leads to the two Reactor Makeup Water pumps located in the Primary Auxiliary Building. The discharge of the two pumps combines in a common header which then divides into three branches.

The first branch includes supply piping to the chemical and volume control resin fill tank, boric acid blender and boric acid batch tank. The branch piping continues through the pipe tunnel to the fuel building where it terminates as a source of makeup for the spent fuel pool.

The second branch boundary includes a continuous recirculation path, supply piping to boron thermal regeneration flush, and makeup piping to the spray additive tank in the tank farm. The boundary ends at the waste process building but briefly re-enters the tank farm and becomes in-boundary at the line connected to drain valve 1-RMW-V-134.

The third branch passes through the penetration tunnel and into the containment. The boundary includes the supply to the reactor coolant drain tank, the Reactor Coolant system primary relief tank and the four Reactor Coolant pump number three standpipe fill lines.

PID-1-AS-LR20571:

The boundary consists of criterion (a)(2) liquid filled components which are the components that interface with Auxiliary Steam System.

PID-1-ACS-LR20907:

The boundary consists of criterion (a)(2) liquid filled components which are the liquid filled components that interface with Auxiliary Steam and Auxiliary Steam Condensate Systems.

PID-1-BRS-LR20861:

The boundary consists of criterion (a)(2) liquid filled components which are the components that interface with the Boron Recovery System in the Tank Farm.

PID-1-CBS-LR20233:

The boundary consists of criterion (a)(1) components which are the components that are providing a pressure boundary with the Containment Building Spray System.

PID-1-CS-LR20723:

The boundary consists of criterion (a)(2) liquid filled components which are the components that interface with the Chemical and Volume Control System.

PID-1-CS-LR20725:

The boundary consists of criterion (a)(1) components which are the components that are proving a pressure boundary with the Chemical and Volume Control System.

PID-1-CS-LR20727:

The boundary consists of criterion (a)(1) components which are the components that are proving a pressure boundary with the Chemical and Volume Control System.

PID-1-CS-LR20729:

The boundary consists of criterion (a)(1) components which are the components that provide pressure boundary with the Chemical and Volume Control System. The criterion (a)(2) boundary consists of the liquid filled components.

PID-1-RC-LR20841, PID-1-RC-LR20842, PID-1-RC-LR20843, PID-1-RC-LR20844:

The boundary consists of criterion (a)(2) liquid filled components which are the components that interface with the Reactor Coolant System.

PID-1-RC-LR20846:

The boundary consists of criterion (a)(2) liquid filled components which are the components that interface with the Reactor Coolant System.

PID-1-SF-LR20483:

The boundary consists of criterion (a)(2) liquid filled components which are the components that interface with the Spent Fuel Pool Cooling System

PID-1-WLD-LR20218:

The boundary consists of criterion (a)(2) liquid filled drain lines which interface with the Waste Processing Liquid Drains System.

PID-1-WLD-LR20219:

The boundary consists of criterion(a)(2) liquid filled drain lines which interface with the Waste Processing Liquid Drains System.

Interfacing Systems

Not included in the Reactor Makeup Water System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam System
- Auxiliary Steam Condensate System
- Chemical and Volume Control System
- Containment Building Spray System
- Demineralized Water System
- Nitrogen Gas System

- Reactor Coolant System
- Resin Sluicing System
- Spent Fuel Pool Cooling System
- Waste Processing Liquid Drains System

System Intended Functions

Provide safe shutdown control and indication (Post Accident Monitoring)	10 CFR 54.4(a)(1)
Maintain system interface with the Chemical and Volume Control System and the Containment Building Spray System.	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO)	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.2.7
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-RMW-LR20360
- PID-1-AS-LR20571

- PID-1-ASC-LR20907
- PID-1-BRS-LR20861
- PID-1-CBS-LR20233
- PID-1-CS-LR20723
- PID-1-CS-LR20725
- PID-1-CS-LR20727
- PID-1-CS-LR20729
- PID-1-RC-LR20841
- PID-1-RC-LR20842
- PID-1-RC-LR20843
- PID-1-RC-LR20844
- PID-1-RC-LR20846
- PID-1-SF-LR20483
- PID-1-WLD-LR20218
- PID-1-WLD-LR20219

Table 2.3.3-31 Reactor Makeup Water System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Filter Housing	Leakage Boundary (Spatial)
Heater Housing	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary
Orifice	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping Element	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-31, Summary of Aging Management Evaluation - Reactor Make-up Water System.

2.3.3.32 Release Recovery System

System Description

The Release Recovery System contains and quenches relief valve discharge from the Chemical and Volume Control System and Boron Recovery System degasifiers as well as the Boron Recovery System, Steam Generator Blowdown System and Waste Processing Liquid System evaporators.

Release Recovery tank, 1-RR-TK-258, is in scope for License Renewal from a spatial consideration due to it's location in the Primary Auxiliary Building. The relief valve in the degasifier system opens at 60 psig to direct flow to the Release Recovery tank, 1-RR-TK-258, located in the Primary Auxiliary Building hallway, outside the degasifier cubicle. Quench tank, 1-RR-TK-258, and the Release Recovery System piping will normally be under a nitrogen blanket to eliminate the potential for explosive gas mixtures if hydrogen is present in the relieving fluid. Under normal conditions, 1-RR-TK-258 will be half filled with demineralized water to ensure that quenching of a design base release can be accomplished. The tank is designed for an eight second release from full open 1-RR-V-655.

In-Scope Boundary Description

Release Recovery
PID-1-RR-LR20061, PID-1-CS-LR20724:

The Release Recovery license renewal scoping boundary consists of the Release Recovery tank and internal piping, a drain line and valve, and level instrument connections. Discharge piping from the letdown degasifier relief valve to the Release Recovery tank is in scope as well as the gas vent line and valves to the Chemical and Volume Control System.

Interfacing Systems

Not included in the Release Recovery System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Chemical and Volume Control System
- Demineralized Water System
- Nitrogen Gas System
- Sample System

System Intended Functions

This system contains components which perform functions credited for Non Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Section 9.3.5 and 9.3.4

License Renewal Drawings

- PID-1-CS-LR20724
- PID-1-RR-LR20061

Table 2.3.3-32 Release Recovery System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-32, Summary of Aging Management Evaluation - Release Recovery System.

2.3.3.33 Resin Sluicing System

System Description

The Spent Resin Sluicing System [Resin Sluicing System (RS)] collects the spent resin from all the demineralizers and ion exchangers of the nuclear plant.

In-Scope Boundary Description

PID-1-RS-LR20252, PID-1-CS-LR20723, PID-1-CS-LR20728, PID-1-SF-LR20483:

The Resin Sluicing System boundary begins with the entry of the resin sluice supply piping entry into the Primary Auxiliary Building. The pipe divides into four branches. The first provides recirculation the spent resin sluice tank. The second is the supply piping to spent fuel cleanup demineralizer up to the Resin Sluicing / Spent Fuel Pool Cooling System interface. The third is the Resin Sluicing System supply to the Chemical and Volume Control System mixed beds and cation demineralizers up to the Resin Sluicing / Chemical and Volume Control System interface. The last is the Resin Sluicing supply to the Boron Thermal Regeneration System’s demineralizer sluice header ending at the Resin Sluicing / Chemical and Volume Control System interface. The return lines from the mixed beds and from the Boron Thermal Regeneration System are in scope for the Chemical and Volume Control System.

Interfacing Systems

Not included in the Resin Sluicing System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Chemical and Volume Control System
- Spent Fuel Pool Cooling System
- Waste Processing Liquid Drains System

System Intended Functions

Provides pressure boundary with the Chemical and Volume Control System.	10CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10CFR 54.4(a)(2)

UFSAR References

- Section 12.2.1.9

License Renewal Drawings

- PID-1-CS-LR20723
- PID-1-CS-LR20728
- PID-1-RS-LR20252
- PID-1-SF-LR20483

Table 2.3.3-33 Resin Sluicing System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-33, Summary of Aging Management Evaluation - Resin Sluicing System.

2.3.3.34 Roof Drains System

System Description

The Roof Drains System is non-safety related. It is installed on major buildings that have relatively flat roofs. The system removes rain water and water from melting snow from the roof. It consists of roof mounted strainers that collect the water and transport it through connected ceiling mounted pipes to the Storm Drain System (not in scope of license renewal). The plant Dewatering System discharges water to the Roof Drains System, which then flows to the Storm Drain System and out to the Circulating Water System for discharge.

In-Scope Boundary Description

PID-1-DR-LR20633, PID-1-DR-LR20634, PID-1-DR-LR20635:

The Roof Drains System boundary consists of those plant roof drains that enter safety related buildings, including connections and cleanouts until the piping leaves the building to the storm drains. The buildings with in-boundary Roof Drain piping are the Fuel Storage Building, East and West Main Steam and Feedwater Pipe Chases, Emergency Feedwater Pump House, Equipment Vaults, Primary Auxiliary Building, Tank Farm, Control Building, Diesel Generator Building and Service Water Pump House.

Interfacing Systems

Not included in the Roof Drains System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Dewatering System
- Plant Floor Drain System

System Intended Functions

This system contains components which perform functions credited for Non Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Section 2.4.2.3
- Section 3.4.1.2

License Renewal Drawings

- PID-1-DR-LR20633
- PID-1-DR-LR20634
- PID-1-DR-LR20635

Table 2.3.3-34 Roof Drains System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Filter Housing	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-34, Summary of Aging Management Evaluation - Roof Drains System.

2.3.3.35 Sample System

System Description

The Sample subsystems from the Reactor Coolant, Steam Generators and other auxiliary systems provide representative gas and liquid samples for laboratory analysis, in accordance with Regulatory Guide 1.21, Positions C.6 and C.7. Typical information obtained includes: Reactor Coolant boron, sodium ion and halogen concentrations, fission product radioactivity level, hydrogen, oxygen, and fission gas content, corrosion product concentration, and chemical additive concentration.

The sample subsystem for secondary steam and water systems provides representative samples for measuring specific and cation conductivity, concentrations of sodium ion, dissolved oxygen and hydrazine.

The system is divided into five subsystems: Reactor Coolant sampling, Steam Generator Blowdown sampling, auxiliary system sampling, secondary steam and water sampling, and post-accident sampling.

In-Scope Boundary Description

Steam Generator Sampling Boundary
PID-1-SS-LR20521, PID-1-SB-LR20626, PID-1-WLD-LR20222:

The sample system boundary for each of the four steam generator sample portions of the Sample System (SS) begin at the inlet to the Steam Generator sample heat exchanger. Each of the four steam generator boundaries continue with the steam generator sample heat exchanger dividing into two branches. The first branch leads to a pair of duplex steam generator sample line filter filters and pressure control valves ending at the system boundary for the Radiation Monitoring System.

Return flow from each radiation monitor continues from the radiation monitor boundary to the steam blowdown flash tank drains. Radiation Monitoring vent lines beginning at the Radiation Monitoring / Sample System boundary combine and flow to the waste liquid drains.

The second branch continues to the chemical sample panel pressure regulator and constant temperature heat exchanger. Each line downstream of the constant temperature heat exchanger continues and divides into a grab sample three-way valve that is normally aligned to a back pressure control valve or alternately to a line for grab samples. Both the grab sample and backpressure flows continue to and terminate in the steam generator sample sink. The remaining line continues through a sample filter.

The outlet of the sample filter divides into four branches, one for pH, one for strong acid cation, one for the sodium concentration and last cation, conductivity. The cation conductivity branch terminates at the Steam Generator sample sink. The last three branches terminate at a connection to waste liquid drains. The sample sink, drain, trap and piping to waste liquid drains are included in the boundary.

Constant temperature chiller liquid and vapor line boundaries begin as they enter the primary auxiliary building and continue to the sample constant temperature cooler.

Pressurizer, Loops 1 and 3 and Residual Heat Removal Sample Boundary PID-1-SS-LR20518, PID-1-SS-LR20519, PID-1-BRS-LR20854, PID-1-CS-LR20725, PID-1-WLD-LR20222:

The Sample System for the pressurizer and, loop one and three sample line boundaries begin at the inlet to the respective pair of series sample coolers. The outlets of the second sample coolers include a valved crossover. These lines then continue to their respective pressure control valve. Downstream of the pressure control valve, the line branches off to a relief valve and the relief valve flow continues to the panel exit leading to the waste liquid drains. The line then divides, going to the sample sink or, joining in a single pipe with a flow indicator for flushing to the volume control tank or alternately the primary drains. A line from the Residual Heat Removal pump discharge connects to the sample sink and upstream of the flow indicator for flushing, a branch connection goes to the Post Accident Sample System panel.

Also connecting upstream of the flow indicator are flush lines from the letdown degasifier cooler, thermal regenerative demineralizer, cation and mixed bed demineralizers and letdown heat exchanger. The primary sample sink drain, trap and piping to waste liquid drains are included in the boundary.

Post Accident Sample Boundary
PID-1-SS-LR20520, PID-1-SS-LR20518, PID-1-SS-LR20519, PID-1-WLD-LR20219, PID-1-RH-LR20663:

The Post Accident Sample boundary begins at the Reactor Coolant / Sample System interface just upstream of the Reactor Coolant post accident sample inlet isolation. The boundary continues, through the post accident sample system heat exchanger, joining with the argon purge connection and containment recirculation sump sample lines (from the residual heat removal pumps). The boundary continues up to the sample cask and bypass lines to the flush tank. The outlet of the flush tank continues through a containment isolation valve and into the containment, ending as it discharges to the containment trench.

Another Sample System boundary begins at the inlet to the Reactor Coolant loop 1 and 3 liquid sample heat exchanger continues through outlet piping including a flex hose to the second liquid sample heat exchanger and on to the primary sample panel. At the panel, flow continues through a pressure control valve where it branches to the sample sink and branches to a relief valve and continues to the panel exit leading to the waste liquid drains.

A third Reactor Coolant / Sample System boundary begins at the inlet to the Reactor Coolant pressurizer steam sample heat exchanger continues through outlet piping including a flex hose to the second steam sample heat exchanger and on to the primary sample panel. At the panel, flow continues through a pressure control valve where it branches to the sample sink and at the panel, flow continues through a pressure control valve where it branches to the sample sink and branches to a relief valve and continues to the panel exit leading to the waste liquid drains.

The Sample System streams from the liquid and steam lines merge to a single line along with sample streams from thermal regenerative demineralizers, letdown heat exchanger, Residual Heat Removal heat exchanger, letdown degasifier and the cation and mixed bed demineralizers. The combined flow passes through a flow indicator where it exits the sample panel. The exit flow branches to the Chemical and Volume Control and to the Waste Processing Liquid Drains systems where the boundary ends.

Wet Lay-up Sample Boundary
PID-1-FW-LR20690:

The wet lay-up portion of the Sample System begins at the Feedwater / Sample System interface at the discharge of each of the four recirculation and wet lay-up pumps. Each line boundary continues through an isolation valve and then to a hose connection. The boundary continues at the outlet of the flex hose and includes the inlet pipe to the sample cooler, the sample cooler and the outlet pipe. The outlet pipe continues to, and includes the sample sink.

Interfacing Systems

Not included in the Sample System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Chemical and Volume Control System
- Demineralized Water System
- Feedwater System

- Radiation Monitoring System
- Reactor Coolant System
- Residual Heat Removal System
- Steam Generator Blowdown System
- Waste Processing Liquid Drains System

System Intended Functions

Provide safe shutdown control and indication (Post Accident Monitoring).	10CFR 54.4(a)(1)
Provide liquid samples from various locations within the Chemical and Volume Control System.	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.2.3.1
- Section 9.3.2.2
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-BRS-LR20854
- PID-1-CS-LR20725

- PID-1-FW-LR20690
- PID-1-RH-LR20663
- PID-1-SB-LR20626
- PID-1-SS-LR20518
- PID-1-SS-LR20519
- PID-1-SS-LR20520
- PID-1-SS-LR20521
- PID-1-WLD-LR20219
- PID-1-WLD-LR20222

Table 2.3.3-35 Sample System
Components Subject to Aging Management Review

Component Type	**Intended Function**
Bolting	Leakage Boundary (Spatial)
Filter Housing	Leakage Boundary (Spatial)
Flexible Hose	Leakage Boundary (Spatial)
Heat Exchanger Components	Leakage Boundary (Spatial)
Heater Housing	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping Element	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)
Trap	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-35, Summary of Aging Management Evaluation - Sample System.

2.3.3.36 Screen Wash System

System Description

The Service Water traveling screens form a full-channel mesh strainer that removes debris from the water flowing into each Service Water pump bay. The debris collected on the screen is removed by a high pressure water spray supplied by the Service Water screen wash pump.

The Circulating Water traveling screens prevent fish and debris from entering the Circulating Water System. One traveling screen is provided for each Circulating Water pump bay. Debris is collected on the upstream side of the traveling screen and is carried upward as the screen rotates. As the debris nears the top of screen travel, high velocity jets of water from the screen wash nozzles flush it out.

The Circulating Water screen wash pumps are one means to supply the Chlorination System with salt water. Flow to the Chlorination System from the Screen Wash System pumps goes through a common header. The sodium hypochlorite metering pumps discharge into this common header.

During initial startup or total Circulating Water System shutdown, water is supplied to one of two Circulating Water lube water pumps from the Service Water screen wash pump.

In-Scope Boundary Description

The Screen Wash (SCW) System consists of criterion (a)(2) components which are potentially liquid filled piping components located in buildings that contains safety related components.

Screen Wash System
PID-1-SCW-LR20709:

The Screen Wash System scoping boundary begins at the suction of the Service Water screen wash pump in the Service Water Pump House fore bay. The pump discharge piping divides to supply the two Service Water traveling screens via individual strainers. The boundary includes the traveling screen housing and a 2” drain line ending in the trash trough.

The supply header boundary includes a supply to the Circulating Water lubricating water system with the boundary ending as the piping exits the Service Water Pump House. The header also has connections to future unit 2 piping, ending at blank flanges.

Interfacing Systems

The Screen Wash System does not interface with any license renewal systems.

System Intended Functions

This system contains components which perform functions credited for Non Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- 10.4.5

License Renewal Drawings

- PID-1-SCW-LR20709

Table 2.3.3-36 Screen Wash System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Filter Housing	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Pump Casing	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-36, Summary of Aging Management Evaluation - Screen Wash System.

2.3.3.37 Service Water System

System Description

The Service Water System was originally designed for two units. The Service Water Pump House has a pump bay for each unit. Each pump bay has two supplies one from the intake discharge transition structure and one from the discharge transition structure. The unit two supply valves are locked closed and de-energized. Unit two is non operational. The Unit two service water return is blanked off and is not used.

The Unit One Service Water System consists of two independent and redundant flow trains, each of which supplies cooling water to a primary component cooling water heat exchanger, a Diesel Generator jacket water cooler, the secondary component cooling water heat exchangers, the auxiliary secondary component cooling water heat exchangers, the condenser water box priming pump seal water heat exchangers, and, except during a loss of coolant accident, to the Fire Protection System during a fire.

Flow in each redundant train is supplied by two redundant Service Water pumps. Each Service Water pump is capable of supplying 100 percent of the flow required by each flow train to dissipate plant heat loads during normal full power operation. Thus, for full power operation two pumps (one pump per flow train) will be required.

The four Service Water pumps take suction from a common bay in the Service Water Pumphouse. Seawater flow is supplied to the Service Water Pumphouse from the Atlantic Ocean due to the static head of the ocean above the elevation of the Service Water pumps suctions.

The Atlantic Ocean serves as the normal ultimate heat sink for Seabrook Station. In the unlikely event that seawater flow to the Service Water Pumphouse is restricted (>95 percent blockage) due to seismically induced damage to the circulating water (seawater) intake and discharge tunnels, a mechanical draft evaporative cooling tower is provided to dissipate shutdown and accident heat loads. The mechanical draft cooling tower is completely independent of the circulating water tunnels and the Atlantic Ocean.

The Cooling Tower consists of one independent cell with one fan and a center cell with two fans. A third cell was included for anticipated Unit 2 operation but remains nonfunctional. The cooling tower basin consists of a pump well and one catch basin for each of the two tower spray cells. The unit has an "A" and a "B" cooling tower complex flow train. The Cooling Tower pumps with associated valves, piping and equipment in the trains circulate cooling water from the pump well basin through the primary component cooling heat exchangers and the Secondary Component Cooling Water heat exchangers during normal operations or the Diesel Generator heat exchangers during loss of offsite power conditions or both during test.

Makeup to the Cooling Tower can be provided by a portable tower makeup pump, (in the event that normal makeup source is unavailable and the Service Water pumps are unavailable). Regulatory Guide (RG) 1.27 requires a heat sink capable of providing cooling for 30 days; the Cooling Tower has a 7 day supply. The pump is maintained on site and stored in a seismic area. The Cooling Tower makeup pump is tested every 18 months per Technical Specifications. After the pump is tested it is flushed with potable water. It is capable of providing makeup water to the tower basin from the nearby Browns River or Hampton Harbor with several locations accessible by road. It consists of 3000 feet of 5-inch rubber-lined polyester flexible hose and associated hose couplings and a portable diesel-driven pump that is self-priming within 15 feet of water level, and is designed to deliver a minimum of 200 gpm from the water source to the tower basin. The seven-day period that the tower can operate without makeup water provides sufficient time to move the pump into position, lay the hose and make the system ready for operation. This pump is in scope of License Renewal as functional (a)(2).

In-Scope Boundary Description

Service Water Ocean Cooling
PID-1-SW-LR20794, PID-1-SW-LR20795:

The Service Water System boundary begins at the intake transition structure wall with the normal supply line ending in the Service Water forebay. During periods of heat treating, the ocean cooling supply is aligned from the discharge transition structure supply line ending in the Service Water forebay.

Flow continues through a traveling water screen (part of the screen wash system boundary). Multistage long shaft pumps take suction on the seawater and discharge both forward and to a continuous vent line with orifice returning to the forebay. The pairs of train related pump discharge lines join to form two lines continuing from the Service Water pumphouse. The lines join the train associated Service Water Cooling Tower supply. The two lines then continue underground and enter the pipe tunnel. The A train supply header has a branch connection to supply the Fire Protection stand pipe header. The two train boundaries continue and include the two Service Water strainers. At the outlet of the strainers the boundary branches to support the secondary loads, component cooling and Diesel Generator heat exchangers.

The “A” and “B” train secondary supplies join in a single line to supply secondary loads with the boundary terminating at the exit of the Service Water vault. A single line returning from the auxiliary secondary component cooling water heat exchangers begins as the line enters the Service Water vault and divides and connects down stream of the two component cooling water heat exchangers.

The “A” train component cooling and Diesel Generator heat exchangers are in parallel as are the “B” train component cooling and Diesel Generator heat exchangers. The outlet lines from each parallel set of heat exchangers branch to form a common line for normal discharge, and a train related line for cooling tower return to the spray headers. The normal discharge line with overflow pipe continues underground and branches to the intake transition structure wall and to the discharge transition structure wall. During periods of heat treating the ocean cooling return is aligned to the intake transition structure.

Service Water Cooling Tower
PID-1-SW-LR20794, PID-1-SW-LR20795, PID-1-SW-LR20796:

The Service Water Cooling Tower boundary begins as the Cooling Tower pumps take suction from the Service Water Cooling Tower basin. Each train discharge divides into a spray header test line, a pump recirculation / spent fuel cooling supply line and, the system supply line.

The Service Water Cooling Tower supply from the train associated tower pump joins the normal Service Water pump discharge as noted above. The spray header test lines join the returning Service Water to the tower spray headers while the recirculation line branches to the tower basin. The recirculation line also branches to join with the opposite train to supply the alternate spent fuel cooling heat exchanger, ending at a blank flange as the line leaves the cooling tower building.

The Service Water returns to the tower from the normal Service Water return lines beginning at the outlet of the each train of component cooling heat exchangers. The lines pass underground to the tower where the lines continue to the spray headers, separately ending at the Unit 1 and at the common bay spray nozzles. Each header also has a branch to spray bypass lines ending underwater in the respective basin. Each header ends at a blank flange in the Unit 2 bay.

PID-1-SW-LR20794, PID-1-SW-LR20795:

Pump motor oil lines are in-boundary for cooling tower pumps and for the cooling tower fan gear boxes.

Diesel heat exchanger relief valves, vents and drains join in a single line ending at the Primary Auxiliary Building drain to the salt water curbed collection area.

PID-1-WLD-LR20222:

This license renewal boundary drawing shows the boundary between the Diesel Generator jacket water heat exchanger relief valve discharge and drain lines and the Waste Processing Liquid Drains system.

Interfacing Systems

Not included in the Service Water System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Diesel Generator
- Fire Protection System
- Primary Component Cooling Water System
- Waste Processing Liquid Drains System

System Intended Functions

Provide ocean cooling water for the plant primary heat loads, including required process controls.	10 CFR 54.4(a)(1)
Provide alternate cooling water from the Cooling Tower for the plant primary heat loads, including required process controls.	10 CFR 54.4(a)(1)
Provide design basis secondary heat load isolation.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring)	10 CFR 54.4(a)(1)
Provide Cooling Tower makeup (This is a functional (a)(2) function).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Anticipated Transient Without a Scram (ATWS).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Environmental Qualification (EQ)	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.2.1
- Section 9.2.5
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-SW-LR20794
- PID-1-SW-LR20795
- PID-1-SW-LR20796
- PID-1-WLD-LR20222

Table 2.3.3.37 Service Water System
Components Subject to Aging Management review

Component Type	Intended Function
Bolting	Pressure Boundary
Expansion Joint	Leakage Boundary (Spatial) Pressure Boundary
Filter Element	Filter
Filter Housing	Pressure Boundary
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary
Nozzle	Spray
Orifice	Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)
Piping Element	Leakage Boundary (Spatial) Pressure Boundary
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-37, Summary of Aging Management Evaluation - Service Water System.

2.3.3.38 Service Water Pump House Air Handling System

System Description

The Service Water Pump House heating and ventilation systems are comprised of the heating and ventilation systems for the pump room area of the Service Water Pump House.

The ventilation function is provided by the Service Water Pump House Air Handling System. The heating function is provided by the Hot Water Heating System and is evaluated separately.

The pump room area is ventilated and cooled with outside air supplied through pneumatically operated dampers, and exhausted through exhaust fans and backdraft dampers. Each exhaust fan and its associated supply air damper are controlled by a separate thermostat located in the pump room area. The thermostat settings are staggered such that the fans will start in sequence. Each fan is powered by a separate and independent Engineered Safety Features electrical train. Each supply air damper is designed to fail open on loss of air or electric power to its solenoid valve.

The switchgear areas of the Service Water Pump House, one for Electrical Train A equipment and the other for electrical Train B equipment, are ventilated with filtered outside air supplied by one of two full-sized supply fans through a seismically supported duct system. Each fan is powered by a separate and independent Engineered Safety Features electrical train. Air is drawn from the outside through a roll-type filter, a fan, a backdraft damper, and then distributed through ductwork into the two switchgear areas. Air is exhausted from each switchgear area through its respective relief damper. There are two thermostats per fan to control its operation, one in Train "A" switchgear room and the other in Train B switchgear room. Both the thermostats on the lead fan have identical set points.

The Service Water Cooling Tower heating and ventilation systems are comprised of a heating system and a ventilation system for each redundant switchgear room and a ventilation system for the pump room. Each switchgear room and the pump room are ventilated by drawing air from, and exhausting to, the outside.

Ventilation and cooling air is drawn into the ventilation and mechanical equipment area of the pump room from the outside through fixed louvers and a roughing filter.

Cooling of the pump room area, when required, is accomplished by redundant exhaust fans. Each fan is controlled by its individual thermostat. Thermostats are set so if one thermostat, fan or its power supply fails, the redundant fan, served by a separate Class 1E power supply, will start before overheating occurs.

Each of the two Cooling Tower switchgear rooms is supplied with ventilating and cooling air, when required, from its own independent supply fan located in the mechanical equipment area. The supply air fan for each switchgear room is provided electrical power for a Class 1E power source which is independent of the other three. Each supply fan is cycled by a thermostat located in its respective switchgear room. Supply air is directed to the switchgear room via sheet metal ductwork. Heat-laden air from the switchgear rooms is exhausted through a relief damper to the outside.

In-Scope Boundary Description

PID-1-SWA-LR20372:

The Service Water Pump House Air Handling System (SWA) boundary applies to the cooling systems for both the Cooling Tower and the Service Water Pump House.

The Cooling Tower SWA System boundary begins at the outdoor intake through train common filter 1-SWA-F-192. The boundary continues through Train A and B supply fans taking suction on the Cooling Tower ventilation and mechanical room atmosphere. The fans discharge to individual discharge dampers, ducts and fire dampers into the associated Cooling Tower electrical switchgear room. The boundary includes each room’s outlet damper to atmosphere. Air for pump area cooling is also supplied via 1-SWA-F-192 and includes two exhaust ventilation fans and dampers discharging to atmosphere.

The Service Water Pump House SWA System boundary begins outdoors at a common tornado damper. The boundary continues through individual roll filters, fans, and discharge dampers to a common duct. The common duct divides and supplies Train A and B Service Water Pump House switchgear rooms through separate dampers. Heated switchgear room air discharges through individual dampers and tornado dampers returning to atmosphere. The pump area cooling air boundary begins at the outdoor intake area through four intake dampers. Two discharge fans and associated dampers discharge to atmosphere. In addition, two Unit 2 non-functional discharge dampers are included in the boundary.

Interfacing Systems

The Service Water Pump House Air Handling System does not interface with any license renewal systems.

System Intended Functions

Provide cooling via outside air for the Service Water pump area to maintain area design temperatures.	10 CFR 54.4(a)(1)
Provide cooling via outside air for the Service Water (ocean) switchgear rooms to maintain area design temperatures.	10 CFR 54.4(a)(1)
Provide cooling via outside air for the Cooling Tower pump area to maintain area design temperatures.	10 CFR 54.4(a)(1)
Provide cooling via outside air for the Cooling Tower switchgear rooms to maintain area design temperatures.	10 CFR 54.4(a)(1)
Provide pressure relief protection in the event of a tornado (Tornado Dampers)	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.4.13
- Section 9.4.14
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-SWA-LR20372

Table 2.3.3-38 Service Water Pump House Air Handling System Components Subject to Aging Management Review

Component Type	Intended Function
Damper Housing	Fire Barrier Pressure Boundary
Ducting	Pressure Boundary
Ducting Closure Bolting	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Pressure Boundary
Flexible Connector	Pressure Boundary
Screen	Filter

The aging management review results for these components are provided in Table 3.3.2-38, Summary of Aging Management Evaluation - Service Water Pump House Air Handling System.

2.3.3.39 Spent Fuel Pool Cooling System

System Description

The functions of the Spent Fuel Pool Cooling and Cleanup System are to:

- Continuously remove decay heat generated by fuel elements stored in the pool,
- Continuously maintain a minimum of 13 feet of water over the spent fuel elements to shield personnel, and
- Maintain the chemical parameters and optical clarity of the spent fuel pool water, and the water in the reactor cavity and refueling canal during refueling operations.

All portions of the Spent Fuel Pool Cooling loop are designated Safety Class 3, and are designed and constructed to meet seismic Category I requirements. Those portions of the cleanup system not designed to these requirements are normally isolated from the cooling loop.

The Spent Fuel Pool Cooling and Cleanup System is comprised of three sub-systems:

- Spent Fuel Pool Cooling subsystem
- Spent Fuel Pool cleanup subsystem
- Reactor cavity and canal cleanup subsystem.

Spent Fuel Pool Cooling Subsystem:

The spent fuel cooling pumps take suction from the pool and circulate water through the heat exchangers which are cooled by the Primary Component Cooling Water System. Pool water enters the suction line through a strainer near one wall of the pool at a point thirteen feet higher than the return line terminations. The return lines are located at a sufficient distance from the suction line to assure adequate circulation and uniform pool water temperatures. All system connections to the fuel pool penetrate at elevations sufficiently above the top of the fuel to maintain adequate shielding in the event the water level drains to the penetration level. Piping arrangement precludes siphoning below this level. All components in contact with the spent fuel cooling water are stainless steel. The spent fuel pool pump motors are Class 1E motors. 1-SF-P-10A and 1-SF-P-10B are powered from separate emergency busses. 1-SF-P10C can be aligned to be powered from either emergency bus.

Spent Fuel Pool Cleanup Subsystem:

Spent fuel pool water quality is maintained by a pool skimmer loop which filters and demineralizes the circulated water. The pool skimmer loop consists of five pool surface skimmers, a skimmer pump, two filters and a demineralizer. This system is utilized to maintain the pool surface free from floating particles and other materials and to remove radioactive materials in the water. The system is sized to process approximately 120 gpm, which means that one-half of the pool volume is processed in a day. All spent fuel pool cooling and cleanup system equipment is located in the Fuel Storage Building, except the filters and demineralizer which are located in the demineralizer area of the Primary Auxiliary Building. The skimmer pump motor is not Class 1E, and is supplied from a local control center. The spent fuel pool cleanup subsystem can also be used to purify the Refueling Water Storage Tank water, drain the water in the cask loading and fuel transfer canal areas (using a submersible pump), and purify the refueling cavity water during refueling operations. A cleanup system (1-CBS-SKD-161) is also used for Refueling Water Storage Tank or spent fuel pool processing.

Reactor Cavity and Canal Cleanup Subsystem:

The reactor cavity cleanup portion of the system is designed to purify the reactor cavity during refueling operations to improve the optical clarity of the water. The system consists of five surface skimmers at the water surface of the refueling cavity and canal and three drains, all piped to the suction of the reactor cavity cleanup skimmer pump via a lead-shielded disposable cartridge type filter unit. The lead-shielded filter removes radioactive particulate in the refueling water in order to prevent CRUD buildup in socket welded piping downstream of the skimmer pump. This filter also minimizes CRUD buildup in the Chemical and Volume Control System and Spent Fuel Pool Cleanup System filters and demineralizers depending on the particular lineup. The cavity water is pumped through the chemical and volume control system mixed bed demineralizer and filters to the suction of the residual heat removal pumps where it is returned to a cold leg through a residual heat removal heat exchanger. During cavity drain down upon completion of refueling, refueling water can be routed via the Reactor Cavity Cleanup System to the Refueling Water Storage Tank via the Spent Fuel Pool Cleanup System. Also, the Reactor Cavity Cleanup System may be used to send refueling water to the Liquid Waste System floor drain tanks. This lineup would be primarily utilized at the conclusion of drain down when the residual refueling water may not be suitable for return to the Refueling Water Storage Tank. As an alternative to utilizing the installed cavity cleanup pump and shielded filter, a provision exists to install temporary equipment between isolation valves 1-SF-V-81 and 85. The reactor cavity cleanup pump motor is not Class 1E, and is supplied from a motor control center in the Control Building

In-Scope Boundary Description

Spent Fuel Pool Cooling
PID-1-SF-LR 20482:

The Spent Fuel Pool Cooling system boundary begins with the pipe at the outlet of the suction strainer in the spent fuel pool. This line joins with the flanged low suction to form a single line. The suction line divides to supply the two train related spent fuel pool pumps. Two sample lines to the sample sink are attached to the pump casing vents. A third pump takes suction from the same single line and discharges to the common crosstie where it can be aligned to either heat exchanger.

The two pumps discharge to both to the individual heat exchangers and to a common line that is blank flanged at the inlet to an alternate heat exchanger in abandoned status. The discharge also combines to form one line that supplies purification at the inlet to the Spent Fuel purification pre-filter. The third pump can supply either heat exchanger and the purification loop.

The boundary for the normal flow path includes the heat exchangers and the outlet piping that combines into a single line ending in the pool water. Also attached to this line are the makeup line from the Refueling Water Storage Tank and the return from the alternate heat exchanger that begins at a blank flange in the fuel building.

Spent Fuel Pool Cleanup
PID-1-SF-LR20483, PID-1-CBS-LR20233:

The Spent Fuel Pool Cleanup System boundary begins at the five spent fuel pool skimmers and piping which combines to form a single line leading to the spent fuel pool skimmer pump and branching to the Refueling Water Storage Tank and Containment Building Spray System clean up skid (1-CBS-SKD-161).

The Spent Fuel Pool skimmer pump discharge joins with the spent fuel pool cross tie and the connection from the refueling canal skimmer pump a branch line goes to the sample sink. The boundary continues with the fuel pool pre-filter and the pre-filter bypass line. The boundary then continues to the fuel pool demineralizer (with connections to/from resin sluice) and demineralizer bypass line.

The outlet line of the Spent Fuel Pool demineralizer leads to the fuel pool post filter and filter bypass. The line then branches to the Refueling Water Storage Tank and Borated Water Storage Tank, a branch line goes to the sample sink. The Borated Water Storage Tank line boundary ends upon entry into the waste processing building. The line continues and terminates in the spent fuel pool two lines connect to the makeup system one from the Chemical and Volume Control System blender and the other from the Reactor Make-up Water pumps.

PID-1-SF-LR20484:

The boundary for this flow path includes the containment penetration X-39 and the containment isolation valves and the non-safety related piping up to the seismic anchors or equivalent anchors.

PID-1-CS-LR-20723:

Shows Interface with the Chemical and Volume Control System purification demineralizers.

PID-1-RS-LR20252:

Shows interface with the Spent Resin Sluicing System.

PID-1-SW-LR20796:

Shows pressure boundary for the spent fuel pool cooling supply and return lines form 1-SF-E-15C each ending at a blank flange.

PID-1-WLD-LR20219:

Shows non-safety attached to safety relief valve discharge line to containment trench.

PID-1-WLD-LR20220:

Shows interface with the Waste Processing Liquid Drains System in the fuel storage building.

PID-1-WLD-LR20222, PID-1-WLD-LR20223:

Shows interface with the Waste Processing Liquid Drains System in the Primary Auxiliary Building.

Spent Fuel Pool storage racks are civil/structural components, and for License Renewal, are evaluated with the Fuel Storage Building structure.

Interfacing Systems

Not included in the Spent Fuel Pool Cooling System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Boron Recovery System
- Containment Building Spray System

- Chemical and Volume Control System
- Primary Component Cooling Water System
- Reactor Make-Up Water System
- Resin Sluicing System
- Sample System
- Service Water System
- Waste Processing Liquid Drains System

System Intended Functions

Transfer Spent Fuel Pool heat load to the Primary Component Cooling Water system during normal operations.	10 CFR 54.4(a)(1)
Maintain system inventory during normal operations and accident conditions.	10 CFR 54.4(a)(1)
Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.1.2
- Section 9.1.3

License Renewal Drawings

- PID-1-SF-LR20482
- PID-1-SF-LR20483
- PID-1-SF-LR20484

- PID-1-CBS-LR20233
- PID-1-CS-LR20723
- PID-1-RS-LR20252
- PID-1-SW-LR20796
- PID-1-WLD-LR20219
- PID-1-WLD-LR20220
- PID-1-WLD-LR20222
- PID-1-WLD-LR20223

Table 2.3.3-39 Spent Fuel Pool Cooling System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Filter Housing	Leakage Boundary (Spatial)
Flexible Hose	Leakage Boundary (Spatial)
Heat Exchanger Components	Heat Transfer Pressure Boundary
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary
Piping and Fittings	Pressure Boundary Leakage Boundary (Spatial)
Piping Element	Leakage Boundary (Spatial)
Pump Casing	Pressure Boundary Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Thermowell	Pressure Boundary Leakage Boundary (Spatial)
Valve Body	Pressure Boundary Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-39, Summary of Aging Management Evaluation - Spent Fuel Pool Cooling System.

2.3.3.40 Switchyard

System Description

The 345-kV switching station consists of metal-enclosed, gas-insulated components (circuit breakers, disconnect switches, buses, surge arresters, potential devices, etc.) connected by an integral bus system. Pressurized sulphur hexafluoride (SF_6), a nonflammable, nontoxic gas, is used as the insulating and arc-quenching medium. Each circuit breaker and each bus section of the 345-kV switching station forms a separate gas-insulated system that is individually monitored as a 3-phase system. Each 3-phase circuit breaker is supplied with its own self-contained SF_6 gas system. There is no interconnection between the circuit breaker SF_6 gas systems and the switching station gas systems.

The bus section gas systems include the 3-phase bus connections between two circuit breakers, extending to the point of connection to a transformer or to an overhead line. Metal-enclosed, SF_6-insulated buses connect the 345-kV switching station directly to the high voltage bushings of the Generator Step-Up Transformers and the Reserve Auxiliary Transformers.

The electrical configuration of the 345-kV switching station is a breaker-and-half arrangement.

In-Scope Boundary Description

SF_6 ducts and boundary fittings forming the pressure boundary of the Switchyard (SY) System
PID-1-SY-LR20021, PID-1-SY-LR20022, PID-1-SY-LR20023, PID-1-SY-LR20024, PID-1-SY-LR20025:

The first boundary begins at the three phase duct connections to the Generator Step-Up Transformer also shown as detail “L”. The three duct boundaries continue (see detail “G” and “H”), dividing and connecting to the three phases of breaker number 11 shown on detail “C-1”. The boundary ends at the three phases of breaker number 163 shown on detail ”B-1”. The boundary includes one voltage transformer connection per phase as depicted in detail “B-1” and “K”.

The second boundary begins at the three duct connections on each of the reserve auxiliary transformers shown in detail “I”. The individual phases join to form three phase ducts that continue and branch to two breakers, breaker 52 and 95. Each phase common duct boundary contains one voltage transformer connection.

Each breaker contains a gas control system connecting to the interconnected pole tanks (low pressure gas). The boundary leads, through a filter and dryer to a compressor, oil filter, filter dryer, and to the main high pressure reservoir where the excess gas condenses ready for the next breaker cycle.

Interfacing Systems

The Switchyard does not interface with any license renewal systems.

System Intended Functions

This system contains components which perform functions credited for Anticipated Transient Without a Scram (ATWS).	10 FR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 8.1.1
- Section 8.2.1
- Section 8.3.1

License Renewal Drawings

- PID-1-SY-LR20021
- PID-1-SY-LR20022
- PID-1-SY-LR20023
- PID-1-SY-LR20024
- PID-1-SY-LR20025

Table 2.3.3-40 Switchyard
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Expansion Joint	Pressure Boundary
Filter Housing	Pressure Boundary
Piping and Fittings	Pressure Boundary
Rupture Disc	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-40, Summary of Aging Management Evaluation – Switchyard.

2.3.3.41 Valve Stem Leak-Off System

System Description

The Valve Stem Leak-off System collects any stem leak leakage and directs it to a low point drain. This helps reduce the spread of contamination and keeps the water off the floor.

Initially, all manually and motor-operated valves of the Reactor Coolant System, which are 3 inches and larger were provided with double-packed stuffing boxes and intermediate lantern ring leakoff connections. Exceptions to this criterion are gate valves that have been determined to be susceptible to pressure locking, which have been modified to utilize the valve stem leak-off connection as a vent path for the bonnet cavity. Packing configurations have evolved so that the preferred packing configuration is a single packing set. The industry has moved away from double packed stuffing boxes. These changes in packing configuration have been approved for use at Seabrook Station. Accordingly, either packing design configuration is acceptable for use at Seabrook Station. These valves use only a single packing set. Leakage to the atmosphere is essentially zero for these valves.

In-Scope Boundary Description

PID-1-VSL-LR20775:

The boundary for Valve Stem Leak-off System consists of the tubing designated as Valve Stem Leak-off serving valves in the three charging pump rooms, Chemical and Volume Control System valve room, pipe chase room, letdown degasifier room, letdown degasifier pump room and boric acid room all ending at local drains.

PID-1-VSL-LR20777:

In the containment boundary tubing designated as Valve Stem Leak-off serves designated Chemical and Volume Control, Waste Processing Liquid, and Reactor Coolant System valves ending as it joins the Safety Injection System drain header to the Reactor Coolant Drain Tank.

PID-1-VSL-LR20776:

The Valve Stem Leak-off System boundary tubing also services stem leak-offs in Equipment Vaults 1 and 2, the radioactive tunnel, and filter bay area ending at area drains.

Interfacing Systems

Not included in the Valve Stem Leak-off System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Boron Recovery System
- Chemical and Volume Control System
- Nitrogen Gas System
- Reactor Coolant System
- Residual Heat Removal System
- Safety Injection System
- Waste Processing Liquid Drains System

System Intended Functions

This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Section 5.4.12

License Renewal Drawings

- PID-1-VSL-LR20775
- PID-1-VSL-LR20776
- PID-1-VSL-LR20777

Table 2.3.3-41 Valve Stem Leak-off System
Components Subject to Aging Management Review

Component Type	Intended Function
Piping and Fittings	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-41, Summary of Aging Management Evaluation - Valve Stem Leak-off System.

2.3.3.42 Vent Gas System

System Description

The Equipment Vent System [Vent Gas System (VG)] consists of three separate and distinct headers; an aerated vent header, a hydrogenated vent header, and a reactor coolant vent header. Local vents are not considered a part of this system but are vented to nearby ventilation system ducts.

Aerated Vent Header:

The aerated vent header receives vent gas that is predominantly air plus radioactive contaminants from various components in the Boron Recovery System, Liquid Waste System [Waste Processing Liquid System (WL)], Waste Solidification System, Steam Generator Blowdown System, Equipment and Floor Drainage System [Waste Processing Liquid Drains System (WLD)], and the letdown degasifier during an oxygenated letdown sequence. The gas is then filtered and discharged to the atmosphere via the Primary Auxiliary Building normal ventilation cleanup exhaust unit.

Hydrogenated Vent Header:

The hydrogenated vent header collects radioactive contaminated hydrogen gas from the Reactor Coolant Drain Tank, Chemical Volume Control Tank, Pressurizer Relief Tank sample vessel, Chemical Volume Control Tank sample vessel, Primary Drain Tank, Primary Drain Tank degasifier, and the letdown degasifier. Additionally, dependent on gaseous activity, the pressurizer may be purged to the hydrogenated vent header in preparation for outages. The collected gas is then processed through the Radioactive Gaseous Waste System [Waste Gas System (WG)]. The safety valve surge tank provides additional header capacity and reduces the magnitude of pressure fluctuations within the header. A pressure regulating valve maintains a constant pressure of 2 psig in the influent line of the Radioactive Gaseous Waste System that serves to isolate the Radioactive Gaseous Waste System influent line from hydrogenated vent header pressure surges.

Reactor Coolant Vent Header:

The reactor coolant vent header provides for the evacuation of the Reactor Coolant System during filling operations. Additionally, dependent on gaseous activity, the pressurizer may be purged to the hydrogenated vent header via the reactor coolant vent header in preparation for outages. During normal plant operations, the reactor coolant vent header is isolated from the hydrogenated vent header by a locked closed valve. Prior to the Reactor Coolant System filling operation, the hydrogenated vent header is isolated from the reactor coolant vent header, except for a path to the Primary

Auxiliary Building exhaust unit and the line is purged with nitrogen. The reactor coolant vent header is then connected to the components and piping of the Reactor Coolant System by the insertion of a spool piece between the vent line. A separator/silencer separates any entrained liquid which is then drained to containment sump "A". Prior to entering an outage and the opening of the Reactor Coolant System, the pressurizer gas space may be purged to the Primary Auxiliary Building exhaust unit or the hydrogenated vent header dependent on gaseous activity. When routed to the hydrogenated vent header, the reactor coolant vent header is aligned to the pressurizer via the vent spool and purged with nitrogen. Following completion of the pressurizer purge the reactor coolant vent header is isolated from the hydrogenated vent header. An evacuation pump is used during filling operations to direct the air from the reactor coolant vent header to the hydrogenated vent header where it is filtered and discharged to the atmosphere.

In-Scope Boundary Description

Hydrogenated Vent Header
PID-1-VG-LR20780:

The boundary begins in the containment at a support and through a containment isolation valve, containment penetration and continues out of the containment through a containment isolation valve into the mechanical penetration area. The line continues outside the containment ending at a pipe support anchor.

Safety Valve Surge Tank
PID-1-VG-LR20780, PID-1-WLD-LR20223:

The boundary includes the safety valve surge tank and drain line to the waste liquid drain. Connected to the drain line is a nitrogen purge from the Nitrogen Gas / Vent Gas system interface to the drain line.

Interfacing Systems

Not included in the Vent Gas System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Nitrogen Gas System
- Waste Processing Liquid Drains System

System Intended Functions

Provide containment isolation function.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring)	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.3.6
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-VG-LR20780
- PID-1-WLD-LR20223

Table 2.3.3-42 Vent Gas System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Piping and Fittings	Structural Integrity (Attached) Leakage Boundary (Spatial)
Piping and Fittings (Containment Isolation)	Pressure Boundary
Tank	Leakage Boundary (Spatial)
Trap	Leakage Boundary (Spatial)
Valve Body	Structural Integrity (Attached) Leakage Boundary (Spatial)
Valve Body (Containment isolation)	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-42, Summary of Aging Management Evaluation - Vent Gas System.

2.3.3.43 Waste Gas System

System Description

Hydrogenated fission product gases from the reactor coolant letdown stream and from the liquids collected in the primary drain tank and the reactor coolant drain tank are processed in the Radioactive Gaseous Waste System [Waste Gas system (WG)]. An iodine guard bed and a molecular sieve dryer reduce the contamination level of the gases before further processing by the carbon delay beds. The carbon delay beds provide a minimum of 60 days xenon delay and 85 hours krypton delay. Low activity aerated gas streams from the reactor plant aerated vent header, and condenser vacuum pump units are filtered, monitored, and discharged to the plant unit vent.

The Waste Gas System is designed to provide sufficient processing so that gaseous effluents are discharged to the environment at concentrations below the regulatory limits of 10 CFR 20 and within the "as low as is reasonably achievable" guidelines set forth in 10 CFR 50, Appendix I. The Waste Gas System also provides sufficient holdup and control of gaseous releases, as specified in 10 CFR 50, Appendix A, General Design Criterion 60. The Waste Gas System can process a maximum surge flow of 1.2 SCFM from the degasifiers, which is based on the maximum letdown flow of 120 gpm from the Reactor Coolant System to the Chemical and Volume Control System. This represents the most limiting plant operating condition for the Waste Gas System.

The portion of the Waste Processing Building which houses the Waste Gas System is seismic Category I.

The Waste Gas System is designated non-nuclear safety related (NNS). Hydrogen concentration is monitored in cubicles containing Waste Gas System components to detect a leak in the system. Monitoring of hydrogen concentration is not required while the Waste Gas System is inerted with nitrogen. Dual oxygen monitors are provided to sample the process stream to monitor formation of explosive mixtures. An alarm is initiated at a predetermined setpoint prior to reaching a potentially explosive mixture. The Waste Gas System is designed to withstand a H_2 explosion.

The systems compressor waste gas stream is either:

- Returned directly to the Reactor Coolant System via the Volume Control Tank, or the hydrogen injector,
- Stored in the hydrogen surge tank,
- Released to the environment via the equipment vent system, or

- Recycled to the hydrogenated vent header as makeup gas.

In-Scope Boundary Description

PID-1-WG-LR20773, PID-1-NG-LR20135, PID-1-CS-20724:

The Waste Gas system boundary begins as the header enters the Primary Auxiliary Building from the Waste Processing Building. The piping divides to the chemical and volume control tank, and to the static mixer. The chemical and volume control tank line boundary ends at the Waste Gas / Nitrogen Gas System interface. The line to the static mixer line boundary includes a flow transmitter, flow control valve, check valve where the boundary ends at the Waste Gas / Chemical and Volume Control System interface.

Interfacing Systems

Not included in the Waste Gas System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Chemical and Volume Control System
- Nitrogen Gas System

System Intended Functions

Collect and process fission product gases from the reactor coolant letdown stream and from the liquids collected in the primary drain tank and reactor coolant drain tank for release to the plant vent.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Section 11.3.1
- Section 11.3.2

License Renewal Drawings

- PID-1-CS-LR20724
- PID-1-NG-LR20135
- PID-1-WG-LR20773

Table 2.3.3-43 Waste Gas System
Components Subject to Aging Management Review

Component Type	**Intended Function**
Bolting	Pressure Boundary
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)

The aging management review results for these components are provided in Table 3.3.2-43, Summary of Aging Management Evaluation - Waste Gas System.

2.3.3.44 Waste Processing Liquid System

System Description

The Liquid Waste System [Waste Processing Liquid System (WL)] is non-nuclear safety class (NNS) and non-seismic Category I, in accordance with Regulatory Guides 1.26 and 1.29. The Liquid Waste System is designed to meet applicable requirements specified in 10 CFR, Parts 20 and 50, as follows:

- Provide a central collection point for radioactive liquid waste. This includes approximately 1200 gallons per week of reactor grade and nonreactor grade leakage from various systems and approximately 400 gallons per week of floor drainage from area wash down.
- Provide preliminary processing through the use of a strainer and filters.
- Concentrate nonvolatile and, to some extent, volatile radioactive liquid contaminants, through evaporation, with a minimum decontamination factor (D.F. = Ratio of specific activity in the bottoms and distillate) of 104, at a bottoms concentration of 12 percent by weight.
- Concentrate the residual contaminants (bottoms) up to 12 percent total dissolved solids for transfer to the Waste Solidification System.
- Produce up to 25 gpm of distillate from the evaporator/condenser. The distillate is demineralized (if necessary) and tested in the Waste Processing Liquid waste test tank before disposal offsite.
- Maintain, during normal operation, the radioactivity content of liquid effluents from the Seabrook Station site within the concentration limits expressed in 10 CFR 20, Appendix B, Table II, Column 2, on an instantaneous release basis and on an annual average release basis to maintain the radioactive liquid effluents so that the dose guidelines expressed in the Appendix I to 10 CFR 50 are not exceeded.
- Provide processing equipment and capacity sufficient to maintain radioactivity in liquid effluents within the applicable flexibility provisions of Appendix I to 10 CFR 50 during anticipated operational occurrences.

In-Scope Boundary Description

Storage and Filtration
PID-1-WL-LR20829:

The (a)(3) boundary consists of the floor drain tanks, piping and components that form the pressure boundary that allows the removal of fire fighting water from safety related building sumps where fixed water fire suppression system have been installed.

Demineralization, Test, and Tank Heating
PID-1-WL-LR20831, PID-1-AS-LR20575, PID-1-ASC-LR20902:

The (a)(2) scoping boundary begins with the two waste test tanks including the six panel heaters. The tank vent lines from the two tanks join and continue until the boundary ends as the line leaves the tank farm area. The boundary includes the waste test tank pump suction and discharge lines inside the tank farm. The boundary also includes the liquid filled components that are located in the Intake & Discharge Transition Structure. Each pump suction line includes a local drain line. The return piping from the clean up skid (1-CBS-SKD-161) ends at the Steam Generator Blowdown system interface.

Interfacing Systems

Not included in the Waste Processing Liquid System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam System
- Auxiliary Steam Condensate System
- Steam Generator Blowdown System
- Waste Processing Liquid Drains System

System Intended Functions

This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 11.2

License Renewal Drawings

- PID-1-AS-LR20575
- PID-1-ASC-LR20902
- PID-1-WL-LR20829
- PID-1-WL-LR20831

Table 2.3.3-44 Waste Processing Liquid System Components Subject to Aging Management Review

Component Type	**Intended Function**
Bolting	Leakage Boundary (Spatial)
Flexible Hose	Leakage Boundary (Spatial)
Heater Housing	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial) Pressure Boundary
Thermowell	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.3.2-44, Summary of Aging Management Evaluation - Waste Processing Liquid System.

2.3.3.45 Waste Processing Liquid Drains System

System Description

This system includes tanks, sumps, pumps, piping and instrumentation, as required, to collect, segregate and control liquid leakage within the radioactively contaminated portions of the plant.

The Equipment and Floor Drainage System [Waste Processing Liquid Drains System (WLD)] is operable during all normal modes of operation. The entire system is classified as NNS, non-seismic Category I, non-Class 1E, with the exception of piping runs through the containment walls, and the isolation valves for these penetrations.

The system is designed to handle all anticipated normal leakage volumes from component and liquid drain sources within the area covered by the Equipment and Floor Drainage System.

The system is also designed to handle all anticipated abnormal leakage from sources such as malfunctioning pump seals, leaky flange gaskets and blown valve stem packing. The maximum expected flow rate into any one sump from all expected abnormal sources is less than the 50 gpm capacity of the sumps in areas containing safety class equipment. Abnormal flows from pipe breaks are not included in the system design.

The areas covered by this system are designed to prevent the backup of water for the areas covered by the system from within the plant or from outside.

Liquids are segregated with respect to their potential for reuse in the plant.

Pump design heads are selected to achieve full-rated pump discharge under worst case operating conditions.

The system is designed to achieve radiation levels in all areas that are as low as is reasonably achievable.

The system is designed to preclude discharge of contaminated liquids into non-contaminated systems.

The system is designed to remove water used for fire fighting. While the postulated fire using two fire hoses at 75 gpm each is in excess of the pumping capability of any two sumps, the resultant minor flooding will not prevent operation of the sump pumps or any equipment in the flooded area.

System Description (By Buildings)

1. Containment Building:

There are two sumps in the Containment Building; one on the minus 26’-0" level (sump A), the other on the minus 53’-4" level (sump B) in the reactor instrument pit. Each sump has two pumps (WLD-P-5A, 5B, 5C and 5D), each with a rated capacity of 25 gpm. Under normal conditions, the lower sump will always be dry as there are no drains directed to it. Entry of water into the instrument pit is prevented by curbs around the two openings at the minus 26’-0" elevation. The tops of these curbs are at an elevation of minus 23’-6". Part of the Equipment and Floor Drain System in the containment is the Reactor Coolant Drain Tank (1-WLD-TK-55) and its associated pumps (WLD-P-33A and 33B). Each pump has a rated capacity in excess of any leakage which could be accepted from the components draining to the RCDT.

2. Primary Auxiliary Building:

The only sump in the PAB is located on the minus 26’-0" elevation. This sump has two pumps (1-WLD-P-70A and 70B), each with a rated capacity of 25 gpm. A pump running-time-totalizer permits checking of gradual increase of leak rate from the Primary Component Cooling Water pumps and other inputs to the sump. Visual inspection of the pipe openings from the Primary Component Cooling Water pumps at the floor drain funnel permits determining which of the pumps may be leaking excessively.

3. RHR/CBS Equipment Vaults:

There are two sumps (sump A and B) in these areas, both on the minus 61’-0" elevation. Each sump has two pumps (1-WLD-P-71A and 71B for sump A and 1-WLD-P-71C and 71D for sump B). All liquid collected in this area is pumped directly from the sumps to the floor drain tanks in the Waste Processing Building.

4. Fuel Storage Building:

There are two sumps in the Fuel Storage Building, one on the 4'-0" elevation (sump A) and one on the 10'-0" elevation (sump B). Each sump has two pumps (sump A, 1-WLD-P-72A and 72B; sump B, 1-WLD-P-72C and 72D) with rated capacity of 25 gpm. All floor drain liquid in the building is pumped to the floor drain tank.

5. Waste Processing Building (not in scope for License Renewal):

The Waste Processing Building has two sumps (sump A and sump B). Both are located at the minus 31′-0" elevation, each with two pumps (1-WLD-P-

101A and 101B for sump A; 1-WLD-P-101C and 101D for sump B). Due to the differing leakage volumes expected in each sump, the pumps in sump “A” each have a rated capacity of 50 gpm, while those in sump B are rated at 25 gpm each. The majority of the leakage in the building directed to the floor drain tanks (1-WLD-TK-59A and 59B). In a separate category is the liquid pumped to the Waste Processing Building from the chemical drain tank (1-WLD-TK-86) in the Administration and Service Building. This liquid is segregated in the two chemical drain treatment tanks (1-WLD-TK-87A and 87B at 3600 gallons each) where it can be treated by adjusting the pH prior to sending it to the Solid Waste System. The liquid, depending on its characteristics, is then pumped by the chemical drain treatment pump (1-WLD-P-142, at 30 gpm) to one of the tanks listed below for disposition:

Waste Test Tank 1-WL-TK-63A & B

Floor Drain Tank 1-WL-TK-59A & B

Waste Concentrates Tank 1-WS-TK-76

Waste Feed Tanks 1-WS-TK-198A & B

Recovery Test Tanks 1-BRS-TK-58A & B

6. Administration and Service Building RCA Walkways (not in scope for License Renewal):

There is just one sump (sump A) in the Administration Building that receives drainage from all contaminated areas. The sump has a single pump (1-WLD-P-230) installed, with rated capacity of 35 gpm. There are two sumps in the Radiologically Controlled Area walkways (sump B and sump C), each with one pump (1-WLD-P-77B and 77C). There is no drainage to any of these sumps. Their purpose is to provide pumping capability in case of pipe leakage in the tunnel. The 1000-gallon chemical drain tank (1-WLD-TK-86) collects drainage from all areas in the Administration Building where the quality of the drain liquids and the contaminants therein could be such to make it undesirable for handling in the Floor Drain System. Instead, the liquid is transferred by the chemical drain transfer pump (40 gpm) to the chemical drain treatment tanks (1-WLD-TK-87A and 87B) in the Waste Processing Building for testing, treatment and final disposition, in a manner suitable to its characteristics.

In-Scope Boundary Description

Reactor Coolant Drain and Chromated Water Collection
PID-1-WLD-LR20218, PID-1-WLD-LR20222, PID-1-BRS-LR20854:

The Waste Processing Liquid Drains (WLD) System boundary begins at the Reactor Coolant Drain Tank with a connection from the Reactor Coolant System receiving influent from the Reactor Coolant pump number 2 seals and the reactor vessel seal leak-off line. The other influent is from the valve stem leak-off header, Vent Gas System up to the Waste Processing Liquid Drains/Vent Gas System interface and to a relief discharging to the containment trench. The outlet boundary continues to a relief and then divides to supply the two reactor coolant drain tank pumps. Each pump has an in-boundary cavity drain to sump "A".

The pump discharges combine to a common line continuing to the reactor coolant drain tank heat exchanger and bypass line through a flow element. The line divides with one branch returning to the tank and the second continuing through the containment penetration and isolation valves to outside the containment and to the Primary Auxiliary Building, ending as the line leaves the Primary Auxiliary Building and enters the Waste Process Building.

The chromated water collection portion of the system boundary begins with the tank and outlet piping leading to the chromated water pump and discharge line. The line divides with each line leading to a train related head tank, each terminating at the Waste Processing Liquid Drains /Primary Component Cooling Water interface.

Primary Auxiliary Building Floor Drains and Sump
PID-1-WLD-LR20222, PID-1-WLD-LR20223, PID-1-WLD-LR20229:

The Primary Auxiliary Building floor drains boundary begins with three drains and a cleanout on the 81' elevation. The line joins with sixteen drains, one cleanout and the drain from the eyewash station. The line continues to the 25' elevation where the boundary joins with eleven drains, an eyewash station, drains from a sample sink and one drain from the 37' elevation. The boundary then continues to the 7' elevation where it joins six drains from the containment enclosure via a loop seal, seven drains and three cleanouts.

Also connecting to the boundary is a line from elevation 25' elevation which collects eleven drains, one eyewash station and two cleanouts. The line continues and joins two drains and a cleanout from the (-) 6' elevation and three drains from the (-) 26' elevation.

The line also accepts a line collecting two drains on the 53' and one on the 25' elevation, the line collects three more drains on the 2' elevation, three on the (-)

6 elevation and five drains on the 7’ elevation, two on the 15’ 5” elevation with three cleanouts all ending as the piping enters the sump “A”.

A single drain from the 26’ elevation of the pipe penetration area joins with five drains and a cleanout on the 7’ elevation of the Primary Auxiliary Building ending as the piping enters the PAB sump “A”.

The Primary Auxiliary Building sump “A” contains two pumps discharging to a header with a sparge line. The discharge joins with the equipment vaults and waste process sump discharges and continues to the floor drain tank inlet header.

Containment Drains and Sumps
PID-1-WLD-LR20219, PID-1-WLD-LR20221:

The boundary includes eight drains from the containment ‘0’ elevation combining and ending at the (-) 26’ elevation containment trench. A single drain at the (-) 3’ elevation provides drainage for the seal table. The line ends at the containment trench. Included in the boundary is the trench termination and pipe connecting to the sump.

Four additional drains at the 0’ elevation combine and end upon entry into the containment sump.

Two sump pumps are included in the boundary for each sump. The sump “A” pump discharge lines combine and branch to a sump sparge line and to the discharge. The sump “B” pumps discharge line combine and join with the combined sump “A”. The line continues and branches to two relief valves and exits the containment through the containment penetration and isolation valves then to the waste processing building floor drain tanks.

Equipment Vault Drains and Sumps
PID-1-WLD-LR20221, PID-1-WLD-LR20229:

The Residual Heat Removal Equipment Vault 1 boundary includes one drain from the (-) 31’ 10” elevation joining two drains from the (-) 50’ elevation combining with three drains from the (-) 61’ elevation and one drain from the (-) 34’ 6” elevation. The line ends upon entry to the equipment vault sump “A”.

The Residual Heat Removal Equipment Vault 2 boundary includes one drain and a cleanout then continues to the (-) 61’ elevation. The line joins with three drains from the (-) 61’ elevation and ends upon entry to the equipment vault sump “B”. Another drain starts at the (-) 31’-10” elevation and is joined by two other drains at the (-) 50’ elevation combining with the drain at the (-) 61’ elevation.

Each of the sumps contains two pumps discharging to a header with a sparge line. The discharges of the two sumps combine and join with the containment sump, Primary Auxiliary Building sump and fuel storage buildings discharge and continue to the floor drain tank inlet header.

Other System Interfaces:
PID-1-WLD-LR20220:

The Fuel Storage Building boundary includes four drains from the 64’ elevation, combining with two drains at the 21’ 6” elevation joining 4 drains from the 7’ elevation and joining one line and a cleanout at the 25’elevation. The drain continues joined by one drain at the 4’ elevation and ends at sump A.

The two sumps in the Fuel Storage Building contain two pumps discharging to a header with a sparger line. The discharges of the two sumps combine and join with the containment sump, Primary Auxiliary Building sump and discharge and continue to the floor drain tank inlet header.

PID-1-WLD-LR20225, PID-MAH-LR20494:

This boundary drawing shows a portion of the drain system that is in scope for fire protection.

PID-1-WLD-LR20228, PID-1-BRS-LR20857, PID-1-DM-LR20351, PID-1-RS-LR20252, PID-1-SB-LR20626, PID-1-SF-LR20484, PID-1-WL-LR20829, PID-1-WL-LR20830:

This boundary drawing shows some of the piping isolation boundaries for the path to the floor drain tanks.

PID-1-CC-LR20205, PID-1-CC-LR20211:

This boundary drawing shows a portion of the path from the chromated water collection tank.

PID-1-DM-LR20350:

This boundary drawing shows the drain path from safety showers in the primary auxiliary building.

PID-1-VSL-LR20776:

This boundary drawing shows floor drains that are also shown on other drawings.

PID-1-VSL-LR20777:

This boundary drawing shows Reactor Coolant and Valve Stem Leak-off connections to the system.

PID-1-WL-LR20831:

This boundary drawing shows Waste Processing Liquid System connection to waste liquid drains.

Interfacing Systems

Not included in the Waste Processing Liquid Drains System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam Condensate System
- Boron Recovery System
- Chemical and Volume Control System
- Containment Air Handling System
- Containment Building Spray System
- Containment Enclosure Air Handling System
- Demineralized Water System
- Diesel Generator
- Fuel Storage Building Air Handling System
- Mechanical Seal Supply System
- Primary Auxiliary Building Air Handling System
- Primary Component Cooling Water System
- Reactor Coolant System
- Reactor Make-up Water System
- Residual Heat Removal System
- Resin Sluicing System
- Safety Injection System
- Sample System
- Service Water System

- Spent Fuel Pool Cooling and Clean-up System
- Steam Generator Blowdown System
- Valve Stem Leak-Off System
- Vent Gas System
- Waste Processing Liquid System

System Intended Functions

Provide containment isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
Provide safe shutdown control and indication (Post Accident Monitoring)	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 9.3.3
- Table 6.2-83
- Table 7.5-1

License Renewal Drawings

- PID-1-BRS-LR20854
- PID-1-BRS-LR20857
- PID-1-CC-LR20205

- PID-1-CC-LR20211
- PID-1-DM-LR20350
- PID-1-DM-LR20351
- PID-1-MAH-LR20494
- PID-1-RS-LR20252
- PID-1-SB-LR20626
- PID-1-SF-LR20484
- PID-1-VSL-LR20776
- PID-1-VSL-LR20777
- PID-1-WL-LR20829
- PID-1-WL-LR20830
- PID-1-WL-LR20831
- PID-1-WLD-LR20218
- PID-1-WLD-LR20219
- PID-1-WLD-LR20220
- PID-1-WLD-LR20221
- PID-1-WLD-LR20222
- PID-1-WLD-LR20223
- PID-1-WLD-LR20225
- PID-1-WLD-LR20228
- PID-1-WLD-LR20229

Table 2.3.3-45 Waste Processing Liquid Drains System Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Filter Housing	Leakage Boundary (Spatial) Pressure Boundary
Heat Exchanger Components	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial)
Orifice	Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping and Fittings (Containment Isolation)	Pressure Boundary
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary
Tank	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)
Valve Body	Pressure Boundary Leakage Boundary (Spatial)
Valve Body (Containment Isolation)	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2-45, Summary of Aging Management Evaluation - Waste Processing Liquid Drains.

2.3.4 STEAM AND POWER CONVERSION SYSTEMS

The following systems are addressed in this section:

- Auxiliary Steam System (2.3.4.1)
- Auxiliary Steam Condensate System (2.3.4.2)
- Auxiliary Steam Heating System (2.3.4.3)
- Circulating Water System (2.3.4.4)
- Condensate System (2.3.4.5)
- Feedwater System (2.3.4.6)
- Main Steam System (Includes Main Steam Drain System, 2.3.4.7)
- Steam Generator Blowdown System (2.3.4.8)

2.3.4.1 Auxiliary Steam System

System Description

The Auxiliary Steam System is comprised of the following equipment:

- Two package boilers, each rated at 80,000 lbs/hr of saturated steam at 150 psig, complete with forced draft fans, breeching and common stack
- One 170,000 lb/hr de-aerating heater with storage tank
- Three motor-driven boiler feed pumps rated at 180 gpm each (one spare)
- Triplex fuel oil pumping set (one spare pump)
- One blowdown tank, one fuel oil storage tank and two skid-mounted chemical feed units
- Interconnecting piping
- Safety-related Primary Auxiliary Building isolation valves

During plant start-up excess condensate from auxiliary steam used for turbine gland sealing and shell warming is returned to the Auxiliary Steam Condensate system.

Feedwater from the de-aerator is pumped to the auxiliary boilers and evaporated. Steam is piped to building heating units and operating equipment. Building heating system condensate and the equipment steam and/or drains are added to the main cycle or returned to the auxiliary boiler de-aerator.

The boilers are fired by No. 2 fuel oil. Steam atomization is used during normal boiler operation. Air is the atomizing medium for startup.

During normal plant operation, a branch line from Main Steam System lines can supply the required steam to the Auxiliary Steam System. A pressure-reducing valve reduces the Main Steam pressure to that equivalent to the output of the auxiliary boilers. The pressure reducing station is closed during station startup, when the auxiliary boilers furnish the required steam. The Auxiliary Steam Primary Auxiliary Building isolation valves are operable from the Main Control Board and close automatically on a High Energy Line Break (HELB) signal.

In-Scope Boundary Description

Primary Auxiliary and Fuel Storage Buildings
PID-1-AS-LR20570, PID-1-HW-LR20051:

The first portion of the Primary Auxiliary Building Auxiliary Steam license renewal boundary begins as the Auxiliary Steam line enters the Primary Auxiliary Building roof and divides to a pressure control valve, bypass line and a drain trap. The outlet of the pressure control valve has two branches. The first branch supplies a pressure control valve for a hot water heat exchanger with trap. The second branch continues to the Waste Process Building before returning to the Primary Auxiliary Building where the piping and traps are included in the boundary.

A second line enters the Primary Auxiliary Building where the boundary continues to the inlet of the degassifier heat exchanger and the degassifier preheat heat exchanger with inline condensate traps. The trap drains end at the Auxiliary Steam / Auxiliary Steam Condensate interface. A branch line continues to the Fuel Storage Building supplying a regulator with a trap and five hose connections.

PID-1-MS-LR20582:

A branch connection enters the Emergency Feedwater Pump House and supplies steam for testing the steam driven Emergency Feedwater pump.

Personnel Hatch Area and West Main Steam and Feedwater Pipe Chase:
PID-1-AS-LR20569:

The boundary begins at a pipe anchor in the yard before the Auxiliary Steam piping enters the West Main Steam and Feedwater Pipe Chase. The main Auxiliary Steam line continues through the chase with the boundary terminating at a pipe anchor as the pipe exits the chase.

A branch off the main Auxiliary Steam line enters the pipe tunnel and then proceeds to the personnel hatch area where the boundary includes a regulator and bypass to the Auxiliary Steam / Auxiliary Steam Heating interface. The branch line in the pipe tunnel has a pipe terminating at the Auxiliary Steam / Auxiliary Steam Condensate interface.

Tank Farm Area
PID-1-AS-LR20571, PID-1-AS-LR20575, PID-1-ASC-LR20907, PID-1-ASC-LR20902, PID-1-WL-LR20831, PID-1-CBS-LR-20233, PID-1-BRS-LR20861:

The first Auxiliary Steam boundary in the tank farm is a continuation of the Primary Auxiliary Building piping in the tank farm. The pipe enters the tank farm and divides in four supplies. One line leads to a control valve, bypass, and drain, and ends at the heating panels for the reactor makeup water tank.

The second line leads to a control valve, bypass, and drain, and ends at the heating panels for the refueling water storage tank. The third line leads to a control valve, bypass, and drain, and ends at the heating panels for the spray additive tank. The last supply has a drain and divides into two lines, both exiting to the Primary Auxiliary Building and ending at the two unit heaters Auxiliary Steam / Auxiliary Steam Heating interface.

The second Auxiliary Steam boundary in the tank farm begins as Auxiliary Steam enters the tank farm roof and connects to four control valves, bypass drain sets, and a header drain. Two of the control valves supply the heating for Boron Recovery test tanks and the other two supply the Waste Processing Liquid tanks. The Auxiliary Steam supply piping boundary ends at each of the four tank's heaters.

The last boundary in the tank farm area are the thermowells associated with temperature indicating components that are installed in the Waste Processing Liquid system tanks 1-WL-TK-63-A and 1-WL-TK-63-B, the Refueling Water Storage Tank 1-CBS-TK-8, the Spray Additive Tank 1-CBS-TK-13, and the Boron Recovery system tanks 1-BRS-TK-58A and 58B.

Interfacing Systems

Not included in the Auxiliary Steam system license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam Condensate System
- Auxiliary Steam Heating System
- Boron Recovery System
- Chemical and Volume Control System
- Containment Building Spray System
- Hot Water Heating System
- Main Steam System
- Reactor Makeup Water System
- Waste Processing Liquid System

System Intended Functions

Provide Primary Auxiliary Building (PAB), Auxiliary Steam isolation.	10 CFR 54.4(a)(1)
Provide pressure boundary for the Refueling Water Storage Tank and the Spray Additive Tank in the Containment Building Spray system.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)

UFSAR References

- Section 10.4.11

License Renewal Drawings

- PID-1-AS-LR20569
- PID-1-AS-LR20570
- PID-1-AS-LR20571
- PID-1-AS-LR20575
- PID-1-ASC-LR20902
- PID-1-ASC-LR20907
- PID-1-BRS-LR20861
- PID-1-CBS-LR20233
- PID-1-HW-LR20051
- PID-1-MS-LR20582
- PID-1-WL-LR20831

Table 2.3.4-1 Auxiliary Steam System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Filter Housing	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Thermowell	Leakage Boundary (Spatial) Pressure Boundary
Trap	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.4.2-1, Summary of Aging Management Evaluation - Auxiliary Steam System.

2.3.4.2 Auxiliary Steam Condensate System

System Description

The Auxiliary Steam Condensate system is part of the Auxiliary Steam system as described in the USFAR Chapter 10.4.11.

During plant start-up, excess condensate from Auxiliary Steam used for turbine gland sealing and shell warming is returned to the Auxiliary Steam Condensate System. During normal operation, building heating system condensate and the equipment steam and/or drains are added to the main cycle or returned to the auxiliary boiler de-aerator. In the event that any of the systems being supplied with Auxiliary Steam become contaminated, the auxiliary condensate will in turn become contaminated. To prevent the auxiliary boiler from becoming contaminated, the unit is equipped with a radiation monitor which samples the condensate in the condensate return line. If the radionuclide concentration exceeds a pre-selected level, the monitor automatically terminates the condensate return.

In-Scope Boundary Description

Tank Farm Area
PID-1-ASC-LR20902:

The boundary in the tank farm area includes the Auxiliary Steam Condensate lines from the six Waste Processing Liquid System tank heating panels, three Boron Recovery System tank heating panels connecting to an Auxiliary Steam Condensate 1½-inch line (evaluated with Auxiliary Steam System) and ending as the line leaves the room and enters an area that does not contain safety related equipment.

PID-1-ASC-LR20907:

The boundary for the Refueling Water Storage Tank area includes the Auxiliary Steam Condensate lines from the Spray Additive Tank, Reactor Makeup Water System tank, and Refueling Water Storage Tank heating panels, and two unit heaters continuing into the Primary Auxiliary Building to 1-ASC-TK-116. The boundary includes 1-ASC-TK-116 piping and pumps except for roof mounted components, and ends upon exit from the building.

Personnel Hatch Area
PID-1-ASC-LR20908, PID-1-ASC-LR20926, PID-1-AS-LR20569:

The Auxiliary Steam Condensate boundary starting at the Auxiliary Steam trap drain in the personnel hatch area continues to, and returns from 1-ASC-TK-239. It then joins a line from the main steam and feedwater area Auxiliary Steam trap drain and a line from the Primary Auxiliary Building receiver (upon entry into the penetration tunnel from outside). The boundary ends upon exit from the penetration tunnel at a pipe support.

Primary Auxiliary Building
PID-1-ASC-LR20906, PID-1-AS-LR20570:

The boundary for the Primary Auxiliary Building area begins with the combined trap drains from the fuel building, and letdown degassifier and degassifier pre-heater at the Auxiliary Steam / Auxiliary Steam Condensate interface. The line continues and connects to the boundary of 1-ASC-TK-116.

PID-1-WLD-LR20223:

The boundary for the Auxiliary Steam Condensate is the drain lines from the Auxiliary Steam Condensate traps, strainers, and pump skid drains.

Fire Pump House
PID-1-ASC-LR20912:

Fire Pump House Auxiliary Steam Condensate boundary includes drains from steam lines, Unit Heaters, Tank Heaters up to and including 1-ASH-TK-280, pumps, connected piping, vents, and drains.

Interfacing Systems

Not included in the Auxiliary Steam Condensate System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam System
- Auxiliary Steam Heating System
- Boron Recovery System
- Chemical and Volume Control System
- Containment Building Spray System
- Fire Protection System
- Hot Water Heating System
- Radiation Monitoring System
- Reactor Makeup Water System
- Waste Processing Liquid System

- Waste Processing Liquid Drains System

System Intended Functions

This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 10.4.11

License Renewal Drawings

- PID-1-AS-LR20569
- PID-1-AS-LR20570
- PID-1-ASC-LR20902
- PID-1-ASC-LR20906
- PID-1-ASC-LR20907
- PID-1-ASC-LR20908
- PID-1-ASC-LR20912
- PID-1-ASC-LR20926
- PID-1-WLD-LR20223

Table 2.3.4-2 Auxiliary Steam Condensate System Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial) Pressure Boundary
Filter Housing	Leakage Boundary (Spatial)
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)
Piping Element	Leakage Boundary (Spatial) Pressure Boundary
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary
Tank	Leakage Boundary (Spatial) Pressure Boundary
Thermowell	Leakage Boundary (Spatial)
Trap	Leakage Boundary (Spatial) Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.4.2-2, Summary of Aging Management Evaluation - Auxiliary Steam Condensate System.

2.3.4.3 Auxiliary Steam Heating System

System Description

The Auxiliary Steam Heating System provides low pressure saturated steam to various plant equipment/buildings for heating purposes.

In-Scope Boundary Description

Tank Farm Area
PID-1-ASC-LR20907:

The Auxiliary Steam Heating boundary includes the two unit heaters between the Auxiliary Steam Heating / Auxiliary Steam Condensate interfaces.

Personnel Hatch Area
PID-1-ASC-LR20908, PID-1-AS-LR20569:

The boundary begins at the Auxiliary Steam / Auxiliary Steam Heating interface in the personnel hatch area and continues through a temperature control valve to the Auxiliary Steam Heating / Hot Water Heating Supply interface at the heat exchanger. The boundary includes the piping and connected vacuum breaker. The boundary begins again at the condensate drain and continues up to the Auxiliary Steam Heating / Auxiliary Steam Condensate interfaces.

Primary Auxiliary Building
PID-1-ASC-LR20906:

The Primary Auxiliary Building Auxiliary Steam Heating System boundary includes the piping and thermostatic vent for the Primary Auxiliary Building hot water system heat exchanger. The Auxiliary Steam Heating boundary also includes the condensate drains up to the Auxiliary Steam Heating / Auxiliary Steam Condensate interfaces at the inlet to the trap, and the trap bypass line.

Fire Pump House
PID-1-ASC-LR20912:

The fire pump house Auxiliary Steam Heating boundary begins with the Auxiliary Steam Heating boiler, including the stack, and continues until it exits from the roof. The boundary continues with the steam outlet piping and drain trap. The boundary continues to include five unit heaters and drain lines up to the traps. The supply boundary also includes piping and control valves up to two fire tank heaters, continuing at the exit of the heaters to the traps. The supply piping boundary ends with a line up to the trap and ending at the Auxiliary Steam Heating / Auxiliary Steam Condensate interface on the drain line.

Near Personnel Hatch Area
PID-1-HW-LR20056:

Steam supply to the Hot Water Heating System heat exchanger 1-HWS-E-132 and the associated temperature control valve and piping.

Interfacing Systems

Not included in the Auxiliary Steam Heating System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Boiler (All Systems)
- Auxiliary Steam System
- Auxiliary Steam Condensate System
- Hot Water Heating System
- Fire Protection System

System Intended Functions

This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)

UFSAR References

- Section 10.4.11

License Renewal Drawings

- PID-1-AS-LR20569
- PID-1-ASC-LR20906
- PID-1-ASC-LR20907
- PID-1-ASC-LR20908
- PID-1-ASC-LR20912
- PID-1-HW-LR20056

Table 2.3.4-3 Auxiliary Steam Heating System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial) Pressure Boundary
Filter Element	Filter
Filter Housing	Leakage Boundary (Spatial) Pressure Boundary
Heat Exchanger Components	Leakage Boundary (Spatial) Heat Transfer Pressure Boundary
Instrumentation Element	Pressure Boundary
Piping Element	Pressure Boundary
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Tank	Pressure Boundary
Thermowell	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.4.2-3, Summary of Aging Management Evaluation - Auxiliary Steam Heating System.

2.3.4.4 Circulating Water System

System Description

The Circulating Water System provides cooling water to the main condensers to remove the heat rejected by the turbine cycle and auxiliary systems. The design of the system also includes the capability for furnishing cooling water to the Service Water System, and returning it to the Circulating Water discharge flow. Cooling and lubricating water for the Circulating Water pumps and motors is provided by the discharge of the operating pumps. On the startup of the first Circulating Water pump, the Service Water Screen Wash System pump provides the water source.

In-Scope Boundary Description

Intake and Discharge Transition Structures:
PID-1-CW-LR20673:

The Circulating Water System intake boundary begins at the Intake Transition Structure drywell wall through four 102-inch lines, with one valve and one expansion joint per line, ending at the Circulating Water system pump bay inlet flumes. Two of the four lines are associated with Unit 2 and are not used, but are subject to ground water in-leakage and are thus, included in the boundary.

The Circulating Water system discharge boundary begins at the Discharge Transition Structure drywell wall through two 120-inch lines, valves (1-CW-V-38 and 2-CW-V-68) and expansion joints ending at the Discharge Transition Structure. The Unit 1 return boundary contains an 8-inch connection to the Chlorination System booster pump. Two 120-inch backwash supply lines consisting of piping, valves (1-CW-V-40 and 2-CW-V-70), and expansion joints are located in the Discharge Transition Structure drywell and connect the Discharge Transition Structure to the Unit 1 and Unit 2 backwash conduits.

The boundary includes two 120-inch Circulating Water backwash return lines consisting of piping, valves (1-CW-V-39 & 2-CW-V-69), and expansion joints which are located in a drywell and connect the Unit 1 return flow (backwash) and storm drain effluent to the Intake Transition Structure.

The boundary also includes intake and discharge temperature instrumentation and a vent.

Interfacing Systems

Not included in the Circulating Water system license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Chlorination system

System Intended Functions

This system contains components which perform functions credited for Non Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)

UFSAR References

- Section 10.4.5

License Renewal Drawings

- PID-1-CW-LR20673

Table 2.3.4-4 Circulating Water System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Leakage Boundary (Spatial)
Expansion Joint	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial)

The aging management review results for these components are provided in Table 3.4.2-4, Summary of Aging Management Evaluation - Circulating Water System.

2.3.4.5 Condensate System

System Description

The Condensate System, in conjunction with the Feedwater System, returns the condensate from the turbine condenser hotwells through the regenerative feed heating cycle to the steam generators while maintaining the water inventories throughout the cycle.

Three motor-driven, constant-speed, vertical canned-type condensate pumps withdraw condensate from the three condenser hotwells. During normal operation, only two pumps will be operating and one will be on standby. Seal and priming water are supplied to the condensate pumps from the Condensate Storage Tank or the Demineralized Water System. The condensate pumps discharge into a common header that carries the flow to the steam packing exhauster, which condenses the turbine sealing steam and exhausts noncondensibles through blowers to the atmosphere. The common condensate header distributes the flow equally to the suction side of the two steam generator feed pumps.

Condenser hot well makeup is provided from either the Condensate Storage Tank or the Demineralized Water Storage Tanks upon receipt of a hotwell low level signal. The Condensate Storage Tank is protected from freezing by a recirculation system which utilizes a heat exchanger and pump controlled by tank temperature. All Condensate System connections to the Condensate Storage Tank which are required for normal system operation are located above the tank level required for emergency plant shutdown. The bottom half of the tank (212,000 gallons) is used only for emergency plant shutdown and cooldown by the Emergency Feedwater pumps. The Emergency Feedwater System is evaluated under the Feedwater System.

A steam generator startup feed pump provides normal requirements for startup, cooldown, and no-load operation. The pump takes suction from the Condensate Storage Tank and discharges through a startup heater into the high pressure feed water heater discharge piping. The Startup Feedwater System is evaluated under the Feedwater System. The condensate pumps can also be used for startup by using the steam generator feed water pump bypass piping.

In-Scope Boundary Description

Condensate Storage Tank and Turbine Building
PID-1-CO-LR20426, PID-1-DM-LR20349, PID-1-CO-LR20423, PID-1-CO-LR20422, PID-1-CPS-LR20152:

The Condensate System license renewal boundary begins with the Condensate Storage Tank. The high and low suction pipes join and exit the Condensate Storage Tank enclosure. The line continues through the yard and into the Turbine Building where it provides suction for the startup feed pump and the suction line valve to the condensate transfer pump and includes the bypass line around the pump. The line continues through the condensate heat exchanger and returns to the Condensate Storage Tank, a branch line ends at 1-DM-V-551. Connecting to this line are the demineralized water tank demineralized water makeup line from the Condensate / Demineralized Water interface, a line from the Condensate Storage Tank make up, an isolated line to the condenser shell, an isolated line to the condensate pump suction header, an isolated line terminating at 1-CO-V-518, a connection to the condenser outlet valves stem and condensate pump seal water, the startup feed pump lube oil cooler outlet, a connection from condensate cleaning up to the first check valve, and makeup to the polishing system to the Condensate / Condensate Polishing System interface. Also included in the boundary is the piping from the outlet of the restricting orifice to the inlet of the lube oil heat exchanger, and the line from the tank heater as it exits the Condensate Storage Tank building.

Emergency Feedwater
PID-1-FW-LR20688, PID-1-CO-LR20426:

The Emergency Feedwater portion of the boundary includes the two individual Emergency Feedwater suction lines from the Condensate Storage Tank to the Emergency Feedwater pumps. The combined miniflow line from the Feedwater / Condensate interface to the Condensate Storage Tank is included.

Interfacing Systems

Not included in the Condensate System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Demineralized Water System
- Feedwater System

System Intended Functions

Provide water supply to Emergency Feedwater pumps and alternate connection from the Condensate Storage Tank to the Spent Fuel Pool.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Anticipated Transient Without a Scram (ATWS).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout. (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 6.8.2
- Section 9.2.6
- Section 10.4.7
- Table 7.4-1

License Renewal Drawings

- PID-1-CO-LR20422
- PID-1-CO-LR20423
- PID-1-CO-LR20426
- PID-1-CPS-LR20152
- PID-1-DM-LR20349
- PID-1-FW-LR20688

Table 2.3.4-5 Condensate System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Instrumentation Element	Pressure Boundary
Heat Exchanger Components	Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping and Fittings	Pressure Boundary
Piping Element	Pressure Boundary
Pump Casing	Pressure Boundary
Tank	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in Table 3.4.2-5, Summary of Aging Management Evaluation - Condensate System.

2.3.4.6 Feedwater System

System Description

The Feedwater System receives water from the Condensate System and a portion of the Heater Drain System, (specifically, drains from high pressure heaters No. 6, low pressure heaters No. 5, moisture separator reheater shell drains and moisture separator reheater drains). The feedwater is pumped through the final stage of feedwater heaters (high pressure heaters No. 6) to the four steam generators.

The four feedwater lines exit the Turbine Building; two routed east of the Containment and two routed west, where they enter the East and West Main Steam and Feedwater Pipe Chases. The east and west pipe chases house the feedwater isolation valves, which are located just upstream of the containment penetrations and connections to the steam generators. Immediately upstream of the feedwater isolation valve is a check valve and a flow measuring device. The Emergency feedwater pump discharge connection to each main feedwater line is located between the containment penetration and the feedwater isolation valve.

An ultrasonic feedwater flow measurement system is installed in the common feedwater header just upstream of the feedwater regulating valves. This system is comprised of a 36-inch in-line flow measurement spool piece and a local system processor panel. The ultrasonic flow measurement system provides high accuracy mass flow, feedwater temperature and feedwater pressure signals to the Main Plant Computer System via a digital communication link. These signals are utilized as inputs to the secondary power calorimetric calculation performed by the Main Plant Computer System.

Each steam generator feedwater pump has a recirculation control system which protects the pumps from damage at low loads by ensuring minimum flow. A feed pump gland seal water system regulates the flow of condensate from the condensate pump discharge header to the feed pump seals. Leak-off from the seals to the seal water receiver tank is returned to the condenser using a tank level controller which operates a control valve in the outlet line from the tank to the condenser.

Individual steam turbines drive the steam generator feedwater pumps. The turbine drives are of the dual admission type, and each is equipped with two sets of stop and control valves. One set regulates high pressure steam from the Main Steam System, and the other set regulates low pressure steam extracted from the crossover piping. Gland steam is provided to the turbines from the main turbine gland steam supply system. The exhaust steam from the steam generator feedwater pump turbine drives is condensed in main condenser shells “A” and “C”.

One steam generator startup feed pump provides normal requirements for startup, cooldown and no-load operation. The pump takes suction from the Condensate Storage Tank and discharges through a startup heater into the high pressure feed water heater discharge piping. The pump suction may also be aligned to the Demineralized Water Storage Tanks as a backup water source. Startup feedwater flow may also be directed through both high pressure feed water heaters in series. The Startup Feedwater System is described in Subsection 10.4.12 of the UFSAR. The condensate pumps can also be used for startup by using the steam generator feedwater pump bypass piping. A sampling system is provided and connected to various points in the Condensate, Feedwater and Heater Drains Systems (see UFSAR Subsection 9.3.2).

Condensate and Feedwater chemistry is controlled as described in UFSAR Subsection 10.3.5.

The chemical feed for the condensate and steam generator wet lay up systems is stored in covered tanks for personnel protection.

Emergency Feedwater System

Upon loss of normal feedwater flow, the reactor is tripped, and the decay and sensible heat is transferred to the steam generators by the Reactor Coolant System via the reactor coolant pumps or by natural circulation when the pumps are not operational.

Heat is removed from the steam generators via the main condensers or the main steam safety and/or steam generator atmospheric relief valves. Steam generator water inventory is maintained by water makeup from the Emergency Feedwater System. The system will supply feedwater to the steam generators to remove sufficient heat to prevent the over-pressurization of the Reactor Coolant System, and to allow for eventual system cooldown.

The Emergency Feedwater System is comprised of two full-sized pumps (one motor and one turbine driven) whose water source is the Condensate Storage Tank. Suction lines are individually run from the Condensate Storage Tank to each pump. A common emergency feedwater pump recirculation line discharges back to the Condensate Storage Tank. This return line functions for recirculation pump testing and ensures minimum flow to prevent pump damage for any system low-flow operating condition. Both pumps feed a common discharge header, which in turn supplies the four emergency feed lines. The common discharge header includes normally open gate valves between each branch connection to provide isolation in the event of a pipe break or for maintenance. Each emergency feed line is connected to one of the main feedwater lines downstream of the Feedwater isolation valve. Each main feedwater line enters the containment through a single penetration and feeds a single steam generator.

Additional redundant pumping capability is provided by the startup feed pump in the Feedwater System.

A dedicated 196,000 gallons of demineralized water is maintained in the lower half of the Condensate Storage Tank for the exclusive use of the Emergency Feedwater System.

The branch lines to each steam generator include a manual gate isolation valve, two motor-operated flow control valves, a flow venturi, and a flow orifice. The flow control valves are normally in the open position when the system is not operating and are automatically closed during system operation in the event of a pipe break. These valves can be operated remotely as described in UFSAR Subsection 6.8.5 to control steam generator water level. Two valves in series are provided for redundancy and are powered from different trains. Each valve is also provided with a hand wheel to permit manual operation. The open position of the flow control valves for system limiting conditions will be set to insure the minimum required flow of 470 gpm to three steam generators and a minimum total flow of 650 gpm to four steam generators with one emergency feedwater pump operational.

In-Scope Boundary Description

Startup Feedwater

PID-1-CO-LR20423, PID-1-CO- LR20426, PID-1-FW- LR20687, PID-1-FW-LR20688:

The startup feedwater portion of the license renewal boundary begins with the startup feed pump and first stage supply to the gland seals and to the lube oil cooler. The boundary continues with the pump discharge line and mini-flow piping up to the normally closed pressure control valve. The piping continues at a tie-in line and provides a flow path to the emergency feedwater pumps discharge header and ends at three normally closed valves at interface points a line to the condenser with a normally installed spectacle flange and closed valve, a makeup line to the condenser ending at the feedwater / condensate interface, and a line to the Feedwater / Condensate interface.

PID-1-FW-LR20691:

The lube oil starts at the suction from the lube oil reservoir and continues to the lube oil pump. The discharge passes through a cooler and filter before splitting into two lines, one feeding the outboard pump bearing and the other the motor side pump bearing and the motor bearings. The return flows to the reservoir. A prelube pump takes suction on the oil reservoir and discharges to the same discharge piping as the shaft driven pump.

Emergency Feedwater
PID-1-FW-LR20688, PID-1-FW-LR20686:

The electrically driven emergency Feedwater pump boundary includes the thrust balancing pipe and the first stage supply to gland seals including the restricting orifices.

The turbine driven pump boundary includes the thrust balancing pipe, a first stage supply to gland seals, including the restricting orifices, piping, and orifice to the tube side of the lube oil cooler. The lube oil boundary includes the shaft driven oil pump. The pump suction includes the oil returning from the bearings and any oil from the overpressure relief valve. The pump discharge line flows to the lube oil cooler shell then through an oil filter and on to the pump bearings and governor bearing. Both pumps discharge lines connect to mini-flow lines which join and continue to the Condensate Storage Tank, ending at a Feedwater / Condensate interface. The pumps discharge boundary then joins in a common loop header.

PID-1-FW-LR20690, PID-1-CAS-LR-20411, PID-1-DF-LR20200:

The boundary on these drawings consists of non-safety related components which consist of all the liquid filled components that are contained in safety related buildings.

PID-1-MS-LR20580, PID-1-MS-LR20581:

The boundary on these drawings consists of safety related piping components which are downstream of the Main Steam root valves to Feedwater instruments.

Interfacing Systems

Not included in the Feedwater System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Condensate System
- Main Steam System
- Plant Floor Drain System
- Sample System
- Steam Generators
- Steam Generator Blowdown System

System Intended Functions

Provide design basis reactor coolant system decay heat removal with Emergency Feedwater pumps 1-FW-P-37A and 1-FW-P-37B.	10 CFR 54.4(a)(1)
Maintains design basis water inventory and indication for the Emergency Feedwater function.	10 CFR 54.4(a)(1)
Protect Emergency Feedwater inventory by automatic isolation of a faulted steam generator while maintaining flow to the intact steam generators.	10 CFR 54.4(a)(1)
Maintain main Feedwater to Emergency Feedwater isolation during normal power operation.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Provide Feedwater flow isolation, including line break reverse flow.	10 CFR 54.4(a)(1)
Provide design basis response to ESFAS signals.	10 CFR 54.4(a)(1)
Provide design basis reactor trip, ESFAS, and ATWS signals.	10 CFR 54.4(a)(1)
Provide Containment Isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Anticipated Transients without Scram (ATWS).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 6.8
- Section 9.3.2
- Section 10.3.5
- Section 10.4.7
- Section 10.4.12
- Table 7.4-1
- Table 7.5-1
- Table 6.2-83

License Renewal Drawings

- PID-1-CAS-LR20411
- PID-1-CO-LR20423
- PID-1-CO-LR20426
- PID-1-DF-LR20200
- PID-1-FW-LR20686
- PID-1-FW-LR20687
- PID-1-FW-LR20688
- PID-1-FW-LR20690
- PID-1-FW-LR20691
- PID-1-MS-LR20580
- PID-1-MS-LR20581

Table 2.3.4-6 Feedwater System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Filter Housing	Leakage Boundary (Spatial) Pressure Boundary
Heat Exchanger Components	Heat Transfer Pressure Boundary
Instrumentation Element	Pressure Boundary Leakage Boundary (Spatial)
Orifice	Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping Element	Pressure Boundary
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary
Tank	Leakage Boundary (Spatial) Pressure Boundary
Thermowell	Leakage Boundary (Spatial) Pressure Boundary
Turbine Casing	Pressure Boundary
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.4.2-6, Summary of Aging Management Evaluation - Feedwater System.

2.3.4.7 Main Steam System (Includes Main Steam Drain System)

System Description

The major function of the Main Steam System is to transport the steam generated in the four steam generators to the turbine generator for conversion to electrical power. Heat transferred from the reactor core to the reactor coolant system is subsequently transferred across the steam generator U-tubes for conversion of secondary feedwater into Main Steam. This steam passes through a moisture separator and a flow restrictor as it leaves the steam generator and enters its Main Steam header. The moisture separator improves steam quality, while the flow restrictor prevents excessive steam flow in the event of an unisolable steam line rupture.

The Main Steam System utilizes the following major components:

- Atmospheric steam dump valves (4)
- Steam Generator safety valves (20)
- Main Steam isolation valves (4)
- Main Steam manifold
- Main condenser steam dump valves (12)

Each of the four steam headers penetrates the containment structure and enters the East and West Main Steam and Feedwater Pipe Chase. The pipe chases consist of independent east and west structures, each containing two steam headers. The Main Steam headers travel through the pipe chases to the Main Steam manifold and then into the turbine building. One atmospheric steam dump valve and five steam generator safety valves branch off of each header upstream of the Main Steam isolation valve. The atmospheric steam dump valves act as an alternate heat sink for the reactor core, and the steam generator safety valves provide overpressure protection for the steam generator secondary side. Each header contains a Main Steam isolation valve. These valves provide automatic isolation in the event of a Main Steam line break. The Main Steam isolation valves are designed to seat against full steam pressure in either direction.

The four Main Steam headers leave the pipe chases and join at the Main Steam manifold outside the south end of the turbine building. The Main Steam manifold distributes the steam load evenly between the four steam generators. The Main Steam manifold discharges to the turbine building via six headers. Four of these headers supply the high pressure turbine. The remaining two headers supply the following components:

- Moisture separator reheaters
- Steam Generator feed pump turbines
- Auxiliary Steam System
- Main condenser steam dump valves

The steam driven emergency feed pump requires a guaranteed source of steam in the event the Main Steam isolation valves are closed. Therefore, two 100% capacity steam supplies are provided for the steam driven emergency feed pump. The emergency feed pump supply headers are connected to Main Steam headers "A" and "B" only, upstream of the Main Steam isolation valve. That arrangement ensures that at least one source, from either the East or West Main Steam and Feedwater Pipe Chase, is available to supply the required steam flow.

The Main Steam Drain System components and functions were moved into the Main Steam System for evaluation.

In-Scope Boundary Description

Main Steam
PID-1-MS-LR20580, PID-1-MS-LR20581, PID-1-MS-LR20583:

The Main Steam boundary consists piping downstream of the four flow restrictors on each steam generator. The boundary continues to and includes the forgings downstream of the Main Steam isolation valves. This boundary also includes the Main Steam instruments and up to the root valves on the Feedwater component instruments.

The boundary also includes piping, atmospheric relief valves, discharge lines with noise silencers, emergency feed pump turbine (on the "A" and "B" steam lines only) and the safety relief valves and ball joints up to where the pipe exits the roof. In addition, the boundary includes main stream drain piping.

Emergency Feedwater Pump Supply
PID-1-MS-LR20582, PID-1-MS-LR20587:

Each Main Steam supply for the turbine Emergency Feedwater pump boundary continues from the Main Steam lines for the "A" or "B" steam generators, through a manual isolation, connecting to a drain line and continuing to a control valve then joining to a single line with a control valve and to the stop/throttle valve integral with the turbine ending at the turbine inlet. The supply piping and turbine incorporates various vents and drains shown on the drawing. The drain boundaries terminate on exit from the East and West Main Steam and Feedwater Pipe Chases.

Main Steam Drains
PID-1-DF-LR20200:

The Main Steam Drains to the miscellaneous buildings' drains go to the East and West Main Steam and Feedwater Pipe Chase sumps.

Interfacing Systems

Not included in the Main Steam System license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Auxiliary Steam System
- Feedwater System
- Instrument Air System
- Nitrogen Gas System
- Plant Floor Drain System
- Steam Generators

System Intended Functions

Provide steam to the turbine-driven Emergency Feedwater pump.	10 CFR 54.4(a)(1)
Transport steam from the Steam Generator to the main turbine. (Safety-related up to the Class 2 Forging downstream of the Main Steam Isolation Valves.)	10 CFR 54.4(a)(1)
Provide Steam Generator secondary side overpressure protection.	10 CFR 54.4(a)(1)
Provide controlled cooldown capability and primary pressure control using the Atmospheric Steam Dump Valves when the condenser is not available.	10 CFR 54.4(a)(1)
Provide steam line isolation.	10 CFR 54.4(a)(1)
Provide indication, control, and protection signals.	10 CFR 54.4(a)(1)

Provide safe shutdown control and indication (Post Accident Monitoring).	10 CFR 54.4(a)(1)
Drain accumulated condensate from the Emergency Feedwater turbine-driven pump steam supply lines.	10 CFR 54.4(a)(1)
Provide Containment Isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Anticipated Transients Without Scram (ATWS)	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 10.3
- Table 6.2-83
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-MS-LR20580
- PID-1-MS-LR20581
- PID-1-MS-LR20582
- PID-1-MS-LR20583
- PID-1-MS-LR20587
- PID-1-DF-LR20200

Table 2.3.4-7 Main Steam System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Filter Housing	Leakage Boundary (Spatial) Pressure Boundary
Instrumentation Element	Leakage Boundary (Spatial)
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Piping Element	Leakage Boundary (Spatial)
Pump Casing	Pressure Boundary
Tank	Pressure Boundary
Trap	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.4.2-7, Summary of Aging Management Evaluation - Main Steam System.

2.3.4.8 Steam Generator Blowdown System

System Description

Each of the four steam generators is provided with a bottom blowdown connection on the secondary side above the tube sheet. During normal operation, each steam generator undergoes continuous blowdown with the blowdown water passing through a containment isolation valve, flow meter, and system valves. A small quantity of blowdown is continuously drawn off automatically into the sample system through a sample heat exchanger for monitoring of the activity in the blowdown. If the activity in the blowdown discharge is higher than allowable, blowdown is automatically secured. The blowdown liquid then flows through a manual control valve which establishes the blowdown rate. Some of the liquid flashes upon passing through the control valve, and two-phase flow then enters the flash tank. There, approximately 30 percent of the blowdown flow exits the top of the tank as saturated steam. The remaining 70 percent exits the bottom of the tank as saturated water.

In-Scope Boundary Description

Steam Generator Blowdown to 1-SB-TK-40
PID-1-RC-LR20841, PID-1-RC-LR20842, PID-1-RC-LR20843, PID-1-RC-LR20844, PID-1-SB-LR20626, PID-1-FW-LR20690, PID-1-SS-LR20521:

Each of the four Steam Generator Blowdown loop license renewal boundaries begins at two connections, each with a manual isolation valve, on the shell of the associated steam generator. The two individual connections join and connect to a drain. The loop steam blowdown lines leave the containment with inside and outside containment isolation valves and continue to the Primary Auxiliary Building. In the Primary Auxiliary Building the boundary includes a connection to the Steam Generator Recirculation and Wet Lay-up pumps ending at the Steam Generator Blowdown / Feedwater interface. The boundaries continue to a flow element and piping to the sample system. Each boundary continues to include the blowdown flash tank.

Blowdown Flash Tank:
PID-1-SB-LR20626, PID-1-SB-LR20627, PID-1-SB-LR20629, PID-1-FW-LR20690, PID-1-WL-LR20831, PID-1-WLD-LR20222:

The boundary continues with the blowdown flash tank including relief valves and discharge lines to atmosphere. A tank drain is connected to Waste Processing Liquid Drains. The vapor outlet of the tank divides to continue to the flash steam condenser and to the normal vapor extraction to the turbine building with the boundary ending as the line exits the pipe chase and enters the yard.

The liquid effluent from the flash tank divides and enters the two flash tank bottoms coolers. The “B” heat exchanger has a relief valve and tailpipe included in the boundary. The piping leaving the heat exchangers combine and connect to a normally isolated line to the distillate pumps, and then continues through a level control valve, and continues connecting to two radiation monitor connections. The piping enters the Waste Process Building where it divides to two branches. The first branch has a control valve and the line branches to the liquid waste system ending at the Steam Generator Blowdown / Waste Processing Liquid interface and to the blowdown recovery system ending as the line exits the Waste Process Building. The second branch exits to the liquid waste drain where it ends at the Steam Generator Blowdown / Waste Processing Liquid Drains interface, and to the blowdown recovery system where the boundary ends at two points, as it leaves the pipe chase and as it enters the portion of the Waste Process Building, which is not in scope.

The condensate drain line boundary from the flash steam condenser continues and divides to the two flash tank distillate pumps and a bypass line. The three lines join at the exit of the pumps and include a recirculation line back to the flash steam condenser. The distillate discharge line divides and the boundary terminates as the line leaves the Primary Auxiliary Building.

Interfacing Systems

Not included in the Steam Generator Blowdown system license renewal scoping boundaries are the following interfacing systems, which are separately evaluated as license renewal systems:

- Demineralized Water System
- Feedwater System
- Nitrogen Gas System
- Radiation Monitoring System
- Sample System
- Steam Generators
- Waste Processing Liquid System
- Waste Processing Liquid Drains System

System Intended Functions

Maintain steam generator secondary side pressure boundary	10 CFR 54.4(a)(1)
Provide blowdown isolation on a high energy line break signal.	10 CFR 54.4(a)(1)
Provide safe shutdown control and indication (Post Accident Monitoring)	10 CFR 54.4(a)(1)
Provide Containment Isolation function.	10 CFR 54.4(a)(1)
This system contains components which perform functions credited for Non-Safety Affecting Safety (NSAS).	10 CFR 54.4(a)(2)
This system contains components which perform functions credited for Environmental Qualification (EQ).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Fire Protection (FP).	10 CFR 54.4(a)(3)
This system contains components which perform functions credited for Station Blackout (SBO).	10 CFR 54.4(a)(3)

UFSAR References

- Section 10.4.8
- Table 6.2-83
- Table 7.4-1
- Table 7.5-1

License Renewal Drawings

- PID-1-FW-LR20690
- PID-1-RC-LR20841
- PID-1-RC-LR20842
- PID-1-RC-LR20843

- PID-1-RC-LR20844
- PID-1-SB-LR20626
- PID-1-SB-LR20627
- PID-1-SB-LR20629
- PID-1-SS-LR20521
- PID-1-WL-LR20831
- PID-1-WLD-LR20222

Table 2.3.4-8 Steam Generator Blowdown System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Pressure Boundary
Filter Housing	Leakage Boundary (Spatial)
Heat Exchanger Components	Leakage Boundary (Spatial)
Instrumentation Element	Pressure Boundary
Orifice	Leakage Boundary (Spatial)
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary
Pump Casing	Leakage Boundary (Spatial)
Tank	Leakage Boundary (Spatial)
Thermowell	Leakage Boundary (Spatial)
Valve Body	Leakage Boundary (Spatial) Pressure Boundary

The aging management review results for these components are provided in Table 3.4.2-8, Summary of Aging Management Evaluation - Steam Generator Blowdown System.

2.4 SCOPING AND SCREENING RESULTS: STRUCTURES AND STRUCTURAL COMPONENTS

The determination of structures and structural components within the scope of license renewal is made by identifying Seabrook Station structures and structural components and then reviewing them to determine which ones satisfy one or more of the criteria in 10 Code of Federal Regulations (CFR) 54.4. This process is described in LRA Section 2.1 and the results of the structures and structural components review are contained in LRA Section 2.2. LRA 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 structural components that meet these screening criteria are identified in this section. These identified structural components subsequently require an aging management review for license renewal.

The structures and structural components in the scope of license renewal:

- Buildings, Structures Within License Renewal (2.4.1)
- Containment Structures (2.4.2)
- Fuel Handling and Overhead Cranes (2.4.3)
- Miscellaneous Yard Structures (2.4.4)
- Primary Structures (2.4.5)
- Supports (2.4.6)
- Turbine Building (2.4.7)
- Water Control Structures (2.4.8)

2.4.1 BUILDINGS, STRUCTURES WITHIN LICENSE RENEWAL

Structures Description

The Building, Structures Within License Renewal are miscellaneous buildings that are non-nuclear safety related whose failure could prevent satisfactory accomplishment of a 10 CFR 54.4(a)(1) function or house equipment for any of the 10 CFR 54.4(a)(3) regulated events.

Discharge Transition Structure

The Discharge Transition Structure provides path to discharge cooling water from condenser through discharge tunnel to the ocean, during normal operation. Discharge Transition Structure is also aligned to provide water from discharge tunnel to the Service Water Pumphouse and the Circulating Water Pumphouse if necessary. Discharge Transition Structure is a Non-Category I, seismic structure.

The Discharge Transition Structure also acts as a barrier, designed to resist internal and external missiles.

Fire Pumphouse (including Fire Protection Water Storage Tanks (foundations only), Fire Pumphouse Boiler Building, Boiler Fuel Tank (foundation and steel framing only), and two Fuel Oil Day Tanks (foundations and steel framing only)

The Fire Pumphouse is a Non-Category I, seismic structure which houses electric and diesel-driven fire pumps and associated controls for use in extinguishing any fire that may occur on the site.

Two 500,000 gallon water storage tanks are located adjacent to the Fire Pumphouse. The Fire Protection Water Storage Tanks are Non-Category I, seismic structure.

The Fire Pumphouse Boiler Building & Boiler Fuel Tank are Non-Category I, seismic structure. They are located adjacent to east of the Fire Pumphouse. The Boiler provides heat to the Fire Pumphouse.

Two Fuel Oil Day Tanks provide diesel to the 2 diesel driven fire pumps.

Intake Transition Structure

The Intake Transition Structure provides seawater from the ocean and intake tunnel to the Service Water Pumphouse and the Circulating Water Pumphouse. Intake Transition Structure serves as surge chamber that stabilizes changing water levels. Intake Transition Structure is a Non-Category I, seismic structure.

The Intake Transition Structure also acts as a barrier, designed to resist internal and external missiles.

Nonessential Switchgear Building

The Nonessential Switchgear Building is located on the north side of the Control Building and houses and protects the electrical equipment used to provide lighting for the plant. The building houses Appendix R emergency lighting needed for operation of safe shutdown equipment and for access and egress routes thereto. It is a Non-Category I, seismic structure.

Nonessential Switchgear Building is designed mechanistically to fall away from the Control and Diesel Generator Building under the action of a collapsing of Administration and Service Building. Thus, no significant load is applied to the Control and Diesel Generator Building by either the falling Administration and Service Building or the falling Nonessential Switchgear Building (due to tornado wind and Safe Shutdown Earthquake (SSE) loadings).

Revetment

The Revetment provides flood protection for safety-related structures from a predicted Probable Maximum Hurricane (PMH) Surge. To ensure the flood protection of the safety-related structures during peak PMH surge, protective retaining wall, vertical seawall and revetment (riprap) have been provided along the portions of the site perimeter which will be exposed to wave action. These protective structures are Non-Category I, seismic structure.

Steam Generator Blowdown Recovery Building

The Steam Generator Blowdown Recovery Building is located on the south side of the Waste Processing Building and Tank Farm area, and houses the Steam Generator Blowdown Recovery System.

The Steam Generator Blowdown Recovery Building is a Non-Category I, seismic structure. The tornado effects of the steel framing portion upon the systems and components located within the Steam Generator Blowdown Recovery Building are not a design consideration because the loss of function of these systems and components will not affect the capability of a safe reactor shutdown. The Steam Generator Blowdown Recovery Building is designed not to collapse.

Structures Intended Functions

The Revetment provides protection of safety related structures, systems, and components from Maximum Credible Flood.	10CFR54.4(a)(2)
The Nonessential Switchgear Room provides protection of safety related structures, systems, and components from collapse of the Nonessential Switchgear Room.	10CFR54.4(a)(2)

The Steam Generator Blowdown Recovery Building provides protection of safety related structures, systems, and components from collapse of the Steam Generator Blowdown Recovery Building.	10CFR54.4(a)(2)
The Discharge Transition Structure and the Intake Transition Structures provide the path for ocean water supply to the Service Water Pumphouse and the Circulating Water Pumphouse. Discharge Transition Structure provides path for cooling water from the condenser to the discharge tunnel	10CFR54.4(a)(2)
The Intake and Discharge Transition Structures provides missile protection.	10CFR54.4(a)(2)
The Fire Pump House and the Nonessential Switch Gear Room provide physical support and protection of Systems, Structures, and Components (SSC) credited in the current licensing basis for Fire Protection.	10CFR54.4(a)(3)

UFSAR Reference

Additional details of structures included in the Buildings, Structures Within License Renewal System are provided in the Seabrook Station Updated Final Safety Analysis Report (UFSAR) Sections 1.2.2.19, 1.2.2.20, 2.4, 2.4.5.5, 2.4.11.5, 2.5.5, 9.2.1, 9.5.3; UFSAR Figures 1.2-1, 2.4-21, 2.4-24 and 2.5-47; and UFSAR Tables 3.3.-4, 3.5-1, and 3.7(B)-22.

License Renewal Drawings

- LR-001

Components Subject to an Aging Management Review

LRA Table 2.4.1 lists the commodity groups of the Buildings, Structures Within License Renewal System that require aging management review, including their intended function(s).

LRA Table 3.5.2.1 provides a summary of the results of the aging management review for the Buildings, Structures Within License Renewal System.

Table 2.4.1

BUILDINGS, STRUCTURES WITHIN LICENSE RENEWAL

Component/Commodity Type	Intended Function
CARBON STEEL IN AIR - INDOOR UNCONTROLLED	Structural Support
CARBON STEEL IN AIR - OUTDOOR	Structural Support Flood Barrier Support
CARBON STEEL IN RAW WATER	Flood Barrier Support
CONCRETE MASONRY UNITS IN AIR - INDOOR UNCONTROLLED	Structural Support Fire Barrier
CONCRETE MASONRY UNITS IN AIR - OUTDOOR	Structural Support
CONCRETE IN AIR - INDOOR UNCONTROLLED	Structural Support
CONCRETE IN AIR - OUTDOOR	Structural Support Flood Barrier Missile Barrier Support
CONCRETE IN RAW WATER	Structural Support
CONCRETE BELOW GRADE/SOIL	Flood Barrier Support
FLUOROGOLD IN AIR - INDOOR UNCONTROLLED	Structural Support
ROCK IN AIR - OUTDOOR	Flood Barrier Support
ROOFING, ETHYLENE PROPYLENE DIENYL MONOMER (EPDM) IN AIR - OUTDOOR	Structural Support
STAINLESS STEEL IN AIR - INDOOR UNCONTROLLED	Structural Support

2.4.2 CONTAINMENT STRUCTURES

Structures Description

The Containment Structures are building/structures that enclose, provide physical support and protection for the reactor coolant system, and consists of the following seismic Category I structures; Containment Structure including containment Internal Structures, Containment Enclosure and Containment Enclosure Ventilation Area.

Containment Structure

The containment structure completely encloses a Reactor Coolant System and is a seismic Category I reinforced concrete structure in the form of a right vertical cylinder with a hemispherical dome and flat foundation mat founded on bedrock. The inside face is lined with a welded carbon steel plate, providing a high degree of leak tightness. A protective 4-ft thick concrete mat that forms the floor of the Containment protects the liner over the foundation mat. The containment structure provides biological shielding for normal and accident conditions.

Containment penetrations are provided in the lower portion of the structure, and consist of a personnel lock and an equipment hatch/personnel lock, a fuel transfer tube, and piping, electrical, instrumentation, and ventilation penetrations. All penetrations are anchored to sleeves (or to barrels) which are embedded in the concrete containment wall. This embedment is accomplished by means of an engineered anchorage system that is welded to the sleeve (or barrel) which is, in turn, welded to the locally thickened liner.

The containment structure provides the primary containment.

Containment Enclosure Building

The containment enclosure surrounds the containment structure and is designed in a similar configuration as a vertical right cylindrical seismic Category I, reinforced concrete structure with dome and ring base.

The containment enclosure is designed to entrap, filter and then discharge any leakage from the containment structure. To accomplish this, the space between the containment enclosure and the containment structure, as well as the penetration and safety-related pump areas, are maintained at a negative pressure following a loss-of-coolant accident by fans which take suction from the containment enclosure and exhaust to atmosphere through charcoal filters. To ensure air tightness for the negative pressure, leakage through all joints and penetrations has been minimized.

The containment enclosure provides the secondary containment.

Containment Enclosure Ventilation Area

The containment enclosure ventilation area is an irregularly shaped reinforced concrete building that houses ventilation equipment (fans, filters, etc.) for the Enclosure Building and is located on the southwest side of the containment.

Containment Internals

The containment internals include the intermediate floor slabs, internal walls, steel framing, and other support appurtenances.

The internals provide structural support for safety and non safety related equipment, shielding, and High Energy Line Break (HELB) protection.

Structures Intended Functions

Containment Structures (Containment Enclosure Building, Containment Enclosure Ventilation Area, Containment Internals, and Containment Structure) limit the site boundary radiation doses.	10 CFR 54.4(a)(1)
Containment Structures (Containment Enclosure Building, Containment Enclosure Ventilation Area, Containment Internals, and Containment Structure) provide structural support to safety related components.	10 CFR 54.4(a)(1)
Containment Structures (Containment Enclosure Building, Containment Enclosure Ventilation Area, Containment Internals, and Containment Structure) provide shelter and protection for safety related components.	10 CFR 54.4(a)(1)
Containment Structures (Containment Enclosure Building, Containment Enclosure Ventilation Area, Containment Internals, and Containment Structure) provide structural and functional support to non-safety related components.	10 CFR 54.4(a)(2)
Containment Structures (Containment Enclosure Building, Containment Enclosure Ventilation Area, Containment Internals, and Containment Structure) provide missile protection.	10 CFR 54.4(a)(2)

Containment Structures (Containment Enclosure Ventilation Area, Containment Internals, and Containment Structure) provide HELB shielding.	10 CFR 54.4(a)(2)
Containment Structures (Containment Enclosure Building, Containment Enclosure Ventilation Area, Containment Internals, and Containment Structure) provide flood barrier.	10 CFR 54.4(a)(2)
Containment Structures (Containment Enclosure Ventilation Area, and Containment Structure) house SSC's credited in coping with Anticipated Transient Without Scram (ATWS) (10CFR50.62).	10 CFR 54.4(a)(3)
Containment Structures (Containment Enclosure Ventilation Area and Containment Structure) enclose and protect Environmental Qualification Program (EQ) SSC's (10CFR50.49).	10 CFR 54.4(a)(3)
Containment Structures (Containment Enclosure Ventilation Area and Containment Structure) enclose and protect safety related SSC's credited in coping with Station Blackout (SBO) (10CFR50.63).	10 CFR 54.4(a)(3)
Containment Structures (Containment Enclosure Ventilation Area, Containment Internals, and Containment Structure) provide Fire Protection (FP) (10CFR50.48).	10 CFR 54.4(a)(3)

UFSAR References

The Containment Structures details are provided in Sections 1.2.2, 3.8, and 6.5.3 of the Seabrook Station Updated Final Safety Analysis Report or UFSAR.

License Renewal Boundary Drawings

- LR-001

Components Subject to an Aging Management Review

LRA Table 2.4-2 lists the components and commodity groups of the Containment Structures that require aging management review, including their intended function(s).

LRA Table 3.5.2-2 provides a summary of the results of the aging management review for the Containment Structures.

Table 2.4-2
Containment Structures

Component/Commodity Type	Intended Function
CONCRETE IN AIR - INDOOR UNCONTROLLED	Fire Barrier Flood Barrier HELB Shielding Missile Barrier Shelter, Protection Shielding Structural Pressure Barrier Structural Support
CONCRETE IN AIR - OUTDOOR	Flood Barrier Missile Barrier Structural Pressure Barrier Shelter, Protection Structural Support
CONCRETE IN BELOW GRADE/SOIL	Shelter, Protection Structural Support
CARBON STEEL IN AIR - INDOOR UNCONTROLLED CARBON	Fire Barrier HELB Shielding Shelter, Protection Structural Pressure Barrier Structural Support
CARBON STEEL IN AIR - WITH BORATED WATER LEAKAGE	Fire Barrier HELB Shielding Shelter, Protection Structural Pressure Barrier Structural Support
CARBON STEEL IN AIR - OUTDOOR	Structural Support
ELASTOMER SEAL IN AIR - INDOOR UNCONTROLLED	Fire Barrier Structural Pressure Barrier
ELASTOMER SEAL IN AIR - OUTDOOR	Expansion/Separation Structural Pressure Barrier
GLASS IN AIR – INDOOR UNCONTROLLED	Structural Pressure Barrier
ROOFING IN AIR - OUTDOOR	Shelter, Protection
STAINLESS STEEL IN AIR - INDOOR UNCONTROLLED	Expansion/Separation Fire Barrier Shielding Structural Pressure Barrier Structural Support

Component/Commodity Type	Intended Function
STAINLESS STEEL IN AIR - WITH BORATED WATER LEAKAGE	Expansion/Separation Fire Barrier Shielding Structural Pressure Barrier Structural Support
STAINLESS STEEL IN AIR - OUTDOOR	Structural Support
STAINLESS STEEL IN RAW WATER	Structural Support
THERMAL INSULATION STAINLESS STEEL JACKETING IN AIR WITH BORATED WATER LEAKAGE	Structural Support
THERMAL INSULATION ALUMINUM JACKETING IN AIR WITH BORATED WATER LEAKAGE	Structural Support

2.4.3 FUEL HANDLING AND OVERHEAD CRANES

Structure Description

The Fuel Handling and Overhead Cranes at the Seabrook Station consists of inspection of overhead heavy load cranes encompassed by NUREG-0612 and light load related to refueling handling systems.

These systems are associated with reactor vessel assembly, fuel movement, spent fuel cask, and other overhead lifting activities that could have an affect on safe shutdown equipment or fuel integrity, and are listed below:

- 1-CBS-CR-18A, B (Radioactive Pipe Tunnel Service Monorail Hoists)
- 1-CC-CR-15A, B (Component Cooling Water Pump Service Monorail Hoists)
- 1-CC-CR-41 (Component Cooling Heat Exchanger Service Monorail Hoist)
- 1-CS-CR-5 (Filter Cask Monorail Hoist)
- 1-CS-CR-6 (Boric Acid Batching Monorail Hoist)
- 1-CS-CR-13 (Chemical and Volume Control System Heat Exchanger Monorail Hoist)
- 1-CS-CR-14A, B (Charging Pump Service Monorail Hoists)
- 1-CS-CR-14C (Charging Pump Service Monorail Hoist)
- 1-DG-CR-28A, B (Diesel Generator Service Crane)
- 1-FH-RE-1 (Spent Fuel Cask Handling Crane)
- 1-FH-RE-2 (Spent Fuel Bridge & Hoist)
- 1-FH-RE-5 (Refueling Machine or Manipulator Crane)
- 1-FH-RE-24E, F, G (Radial Arm Stud Tensioner Hoists)
- 1-FW-CR-27 (Emergency Feed Pump Monorail Hoist)
- 1-MM-CR-3 (Polar Gantry Crane)
- 1-MM-CR-49 (Personnel Hatch Jib Crane)
- 1-MS-CR-25A (Main Steam Feedwater Pipe Chase Crane - Monorail)
- 1-MS-CR-25B (Main Steam Feedwater Pipe Chase Crane - Monorail)
- 1-SI-CR-40A, B (Safety Injection Pump Service Monorail Hoist)

Structure Intended Functions

Crane or crane operation could affect safety related system or component	10 CFR 54.4(a)(2)

UFSAR References

Additional details of structures included in the Fuel Handling and Overhead Cranes System are provided in the Seabrook Station Updated Final Safety Analysis Report (UFSAR) Sections 9.1.4, 9.1.5, and UFSAR Table 9.1-7.

License Renewal Drawings

Due to the disparate nature of its components, the Fuel Handling and Overhead Cranes System is not depicted on a License Renewal Drawing.

Components Subject to an Aging Management Review

LRA Table 2.4.3 lists the commodity groups of the Fuel Handling and Overhead Cranes System that require aging management review, including their intended function(s).

LRA Table 3.5.2-3 provides a summary of the results of the aging management review for the Cranes – Overhead and Fuel Handling System.

Table 2.4.3

Fuel Handling and Overhead Cranes

Component/Commodity Type	Intended Function
CARBON STEEL IN AIR - INDOOR UNCONTROLLED	Structural Support
CARBON STEEL IN AIR WITH BORATED WATER LEAKAGE	Structural Support

2.4.4 MISCELLANEOUS YARD STRUCTURES

Structures Description

Miscellaneous Yard Structures are non building structures that are exposed to an outdoor environment. They consist of miscellaneous buried vaults, duct banks and manholes, Condensate Storage Tank Enclosure, and Station Blackout Structures.

Condensate Storage Tank Enclosure

The enclosure is a cylindrical reinforced concrete wall, 2 feet thick and 43 feet high, which surrounds the Condensate Storage Tank. The wall extends from the top of it's foundation at Elev. 23'-0" to Elev. 65'-10". The foundation is a 6 foot thick mat based at Elev. 17'-0". Two irregularly shaped rooms, the North and South Valve Rooms, are built integrally with the circular wall. The Condensate Storage Tank Enclosure is a seismic Category I structure.

Control Room Makeup Air Intake Structures

The control room makeup air intake structures serve as terminals for buried ductwork that provides air for the control rooms during accident conditions. The west air intake air structure consists of a vertical 12-inch diameter carbon-steel pipe terminating in a 180° bend. The Control Room Makeup Air structures are seismic Category I.

Non Safety Related Electrical Duct Banks/Manholes

Select, Non Safety Related Electrical Duct Banks/Manholes house cable supporting Fire Pump 1-FP-P21. The Manholes are reinforced concrete structures.

Safety Related Electrical Duct Banks/Manholes

Safety Related Electrical Duct Banks/Manholes are reinforced concrete structures. The Manholes and the Duct Banks are isolated by seismic joints.

Service Water Access Vault

The Service Water Access Vault is located underground on the plant site north of the Cooling Towers. The Service Water Access Vault provides access to 24" Service Water piping. The Service Water Access Vault is a seismic Category I structure.

Yard Structures that Support Coping with Station Blackout

Equipment Enclosure, and support structures for the following:

345 Kv circuit breakers and controls; SF_6 gas system equipment

345 Kv gas insulated bus ducts

Generator step-up transformers (GSUs)

Unit auxiliary transformers (UATs)

Reserve auxiliary transformers (RATs)

25 Kv bus ducts

5 Kv bus ducts

Structures Intended Functions

The Condensate Storage Tank Enclosure, Control Room Makeup Air Intake Structures, Safety Related Electrical Duct Banks/Manholes, and Service Water Access Vault provide support for safety related components.	10CFR54.4 (a)(1)
The Condensate Storage Tank Enclosure, Control Room Makeup Air Intake Structures, Safety Related Electrical Duct Banks/Manholes, and Service Water Access Vault provide shelter and protection for safety related SSCs.	10CFR54.4 (a)(1)
The Condensate Storage Tank Enclosure, Control Room Makeup Air Intake Structures, and Safety Related Electrical Duct Banks/Manholes provide missile protection.	10CFR54.4(a)(2)
The Condensate Storage Tank Enclosure supports equipment credited for response to Anticipated Transients Without Scram (10 CFR 50.62).	10CFR54.4(a)(3)
The Condensate Storage Tank Enclosure and Non Safety Related Electrical Duct Banks/Manholes house components required by Fire Protection (10 CFR 50.48).	10CFR54.4(a)(3)
Yard Structures that Support Coping with Station Blackout support or protect equipment credited for response to Station Blackout (10 CFR 50.63).	10CFR54.4(a)(3)

UFSAR Reference

Additional details of structures included in Miscellaneous Yard Structures are provided in the Seabrook Station Updated Final Safety Analysis Report (UFSAR) Sections 3.8, and 9.5.

License Renewal Drawings

- LR-001

Components Subject to an Aging Management Review

LRA Table 2.4.4 lists the commodity groups of the Miscellaneous Yard Structures that require aging management review, including their intended function(s).

LRA Table 3.5.2.4 provides a summary of the results of the aging management review for the Miscellaneous Yard Structures.

Table 2.4.4

Miscellaneous Yard Structures

Component/Commodity Type	Intended Function
ALUMINUM IN AIR - OUTDOOR	Structural Support
CONCRETE IN AIR - INDOOR UNCONTROLLED	Fire Barrier Structural Support
CONCRETE IN AIR - OUTDOOR	Missile Barrier Structural Support
CONCRETE BELOW GRADE/SOIL	Structural Support
CONCRETE IN RAW WATER	Structural Support
CONCRETE MASONRY UNITS IN AIR - OUTDOOR	Fire Barrier Structural Support
CONCRETE SUMP IN RAW WATER	Structural Support
CARBON STEEL IN AIR - INDOOR UNCONTROLLED	Structural Support
CARBON STEEL IN AIR - OUTDOOR	Shelter, Protection Structural Support
CARBON STEEL DOOR IN AIR - INDOOR UNCONTROLLED	Structural Support
ISOLATION JOINT, ELASTOMER SEALANTS (RUBBER, NEOPRENE, SILICONE, ETC.) IN AIR - INDOOR UNCONTROLLED	Expansion/Separation
ROOFING IN AIR - OUTDOOR	Shelter, Protection
SEAL, ELASTOMER SEALANTS (RUBBER, NEOPRENE, SILICONE, ETC.) IN AIR - OUTDOOR	Shelter, Protection
STAINLESS STEEL IN AIR - OUTDOOR	Structural Support

2.4.5 PRIMARY STRUCTURES

Structures Description

The Primary Structures are all seismic Category I building/structures that are not part of the Containment Structures or Water Control Structures.

Containment Equipment Hatch Missile Shield

The Containment Equipment Hatch Missile Shield is a removable, precast, reinforced concrete wall located outside the equipment hatch. It protects the hatch from tornado-generated missiles.

Control Building and Diesel Generator Building

The Control and Diesel Generator Building is a reinforced concrete structure founded on fill concrete and rock below grade. This is a multi-function structure in which the two portions, the control room area and the diesel generator area, are separated by a common wall in the north-south direction and are not seismically isolated. The building was analyzed and designed as a unit.

The east portion of the structure (Control Building) has three floors and extends from grade to approximately 79 feet above grade. The two intermediate floors and roof are supported on steel columns in the center and on concrete walls all around. The ground floor contains an electrical equipment room which houses the switchgear, batteries, rod drive controls, and rod drive M-G sets; the second floor is for cable spreading; and the third floor is the main control room.

The control room occupies the entire 75'-0” level of the Control Building, and includes the main control room area, computer room, Technical Support Center, office, conference room and library, emergency storage room, Heating, Ventilation, and Air Conditioning (HVAC) equipment room, kitchen and sanitary facilities. The Control Building contains the building services necessary for continuous occupancy of the control room complex by operating personnel during all operating conditions. The control room emergency makeup air and filtration subsystem is capable of performing the following functions during normal operation, and following a Loss of Coolant Accident (LOCA), a safe shutdown earthquake or a tornado: maintain a positive pressure within the complex at all times with respect to adjacent areas and the outside atmosphere.

The Cable Spreading Room (CSR) on Elevation 50’ – 0” of the Control Building has penetration seals through the floor which are designed to be watertight to protect the electrical equipment below in the Essential Switchgear Rooms.

The west portion of the structure (Diesel Generator Building), which is 95 feet long, has two floors and extends from 36 feet below grade to approximately

59 feet above grade. The portion below grade houses storage tanks for diesel fuel. The area between elevations 20'-0" and 50'-0" is divided, north and south, by a 2 feet thick reinforced concrete wall which supports the second floor and provides protection for each diesel generator against missiles generated by the other. The second floor contains air intakes for the diesel generators and building ventilation equipment. The roof is supported by concrete walls all around and by steel columns in the center extending from the second floor and located directly over the dividing missile wall below.

The building is a seismic Category I, reinforced concrete structure which houses two diesel generators together with their auxiliary equipment and two diesel generator fuel oil storage tanks.

Emergency Feedwater Pump House (Building), including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building

The Emergency Feedwater Pump Building is a seismic Category I structure which is located adjacent to the containment structure. The building consists of the emergency feedwater pump room located above a two-story high electrical cable tray tunnel.

The emergency feedwater pump room contains emergency feedwater pumps, demineralized water makeup pumps, valve stations and an auxiliary control panel. A monorail is provided for servicing the pump. The electrical penetration areas are approximately 84 feet wide and are situated one on top of the other. These tunnels penetrate the Enclosure Building and join with the Containment Structure.

The Pre-Action Valve Building contains the deluge valve for the Fire Protection System and is located on the east side of the Emergency Feedwater Building.

Fuel Storage Building

The spent fuel storage and handling facility consists of four main areas:
(1) the spent fuel pool, (2) the fuel transfer canal, (3) the spent fuel cask loading area and (4) a decontamination area.

The spent fuel pool is a water-filled cavity designed to safely store irradiated fuel assemblies. This pool is constructed of reinforced concrete, with all interior surfaces lined with stainless steel.

The spent fuel pool is monitored for leakage by a series of leak detection channels located adjacent to each liner seam weld. The Leak Monitor System has three channels which will gravity drain to a sump located in the Fuel Storage Building. This zoning arrangement can be used to aid in establishing the location of the leakage. By monitoring the leakage rate, any change in the integrity of the liner can be established.

The fuel storage area is protected against external tornado missiles by 2-foot thick reinforced concrete walls. The large roll-up door on the west wall of the Fuel Storage Building is not designed for tornado missiles; however, a missile wall is provided inside the building to prevent any missiles that could possibly penetrate the roll-up door from reaching the storage pool or cooling equipment.

The elevation of the vehicle loading/unloading area is 20'-6". Protection against flooding is assured since the pool operating floor level elevation is at 25'-0", which is above any postulated flooding conditions resulting from any potential ponding on the site due to extreme rain and wave overtopping.

The storage racks which hold the spent fuel assemblies are modular units, and each unit is freestanding. The spent fuel pool is separated from the fuel transfer canal by a concrete shielding wall with a gate to facilitate the transfer of fuel assemblies. The fuel transfer canal contains the necessary equipment to transfer the fuel assemblies to and from the reactor containment. This equipment includes: (1) a fuel transfer system conveyor car, (2) fuel transfer valve, (3) fuel transfer system lifting frame equipment, (4) fuel transfer system control panel, (5) new fuel elevator, and (6) portions of the Spent Fuel Pool Bridge Crane control console.

Main Steam and Feedwater Pipe Chases – East & West

The main steam and feedwater pipe chase (east) is a reinforced concrete structure which houses and protects the main steam and feedwater piping. The east penetration area is a room located at the southern end of the pipe chases which houses the control panels for the hydrogen recombiner.

The main steam and feedwater pipe chase (west) is a reinforced concrete structure which houses and protects the main steam and feedwater piping. Located below the chase area is the mechanical penetration area which houses piping running between the Containment and the Primary Auxiliary Building. This region is partitioned into several smaller areas which include the radiation and nonradiation shield tunnels.

Personnel Hatch Area

The Personnel Hatch Area is an irregularly shaped seismic Category I, reinforced concrete structure located outside the personnel hatch of the Containment, for which it provides protection from missiles and illegal entry. The Personnel Hatch Area is connected to the west pipe chase.

Primary Auxiliary Building including Residual Heat Removal Equipment Vault

The Primary Auxiliary Building is a seismic Category I, reinforced concrete structure which is located adjacent to the containment structure, and contains most of the auxiliary systems for the Reactor Coolant System. Those systems whose main components are in the Primary Auxiliary Building include the Chemical and Volume Control, Primary Component Cooling, Sample, Low

Pressure Safety Injection, Residual Heat Removal and Containment Spray Systems.

The Primary Auxiliary Building has two intermediate reinforced concrete floors which support miscellaneous auxiliary nuclear equipment, such as heat exchangers, pumps, demineralizers, filters, tanks and ventilation equipment. Reinforced concrete walls and steel columns support the intermediate floors and reinforced concrete roof slab. The building also houses components essential for safe plant shutdown which could be subject to the environmental effects of a High Energy Line Break (HELB).

Three minimum ventilation areas have been defined for the Primary Auxiliary Building. These areas, which are potential sources of airborne activity, are maintained at a negative pressure with respect to surrounding areas.

The residual heat removal and containment spray pumps and their associated heat exchangers are located in water tight compartments in the northern part of the Primary Auxiliary Building. The compartments are isolated from the rest of the Primary Auxiliary Building by concrete walls to preclude flooding the pumps due to a rupture anywhere else in the building. The containment spray pumps are located below grade to satisfy net positive suction head requirements.

The Residual Heat Removal (RHR) equipment vault is subdivided into six compartments by continuous concrete walls as follows: two for containment spray pumps and heat exchangers, two for residual heat removal pumps and heat exchangers, and two for access stairs. Plugs are provided in the reinforced concrete roof for removal of the heat exchangers. The entrance vestibule into the Equipment Vault section of the Primary Auxiliary Building is at elevation 20 feet 8 inches. The floor of this vestibule is sloped up 4 inches so that the high pint in the floor is 1 foot above the plant grade of 20 ft Mean Sea Level (MSL).

Below-grade reinforced concrete pipe tunnels connect the building to the Containment and Waste Processing Building. Monorail hoists are provided to handle materials and servicing of equipment.

Tank Farm (Tunnels) – including Dikes and Foundations for Refueling Water Storage Tank (RWST) and Reactor Makeup Water Storage Tank (RMUWST)

The tank farm area consists of a reinforced concrete portion and structural steel framing portion. The reinforced concrete portions, including the foundation, dike walls, pipe tunnels and pipe chases, are structures associated with safety-related systems and are designed as Seismic Category I.

The structural steel framing portion, which includes steel framing, concrete roofing and metal siding, is used to enclose the area above the tanks and to form the motor control center and switchgear room. The steel framing portion is designated Non-Category I, seismic structure and designed and constructed so that the safe shutdown earthquake (SSE) would not cause the steel framing portion to collapse upon any safety-related structure, system or component within or surrounding the tank farm area.

The tunnels provide a passageway for piping which runs between the Primary Auxiliary Building and either the Service Water Pumphouse or the Service Water Cooling Tower.

The dikes are reinforced concrete walls surrounding the tanks and extending to Elevations 42'-0" and 30'-0" for the RWST dike and the RMUWST dike, respectively. Structural steel framing is used between the tops of the dikes and the roof framing, which is also structural steel.

Waste Process Building

The Waste Processing Building is a seismic Category I, reinforced concrete and steel structure. It houses the Liquid and Gas Waste Processing, Boron Recovery and Solid Waste Systems.

The building contains systems to process radioactive gases, liquids and solids. The gases are processed through charcoal delay beds to provide for iodine removal and radioactive decay of the noble gases. Liquids are processed in demineralizer skids, and can be recycled back into the plant or released if low enough in activity. Evaporators, installed as plant design, are available as an alternate method of processing liquids. Radioactive waste is stored in various locations in the Waste Process Building. Solids are normally stored in various containers and stored on site prior to shipment offsite for burial. The plant contains equipment designed to solidify waste which may be used to process solid waste prior to shipment off site.

Structures Intended Functions

The Control Building and Diesel Generator Building, the Emergency Feedwater Pump Building, the Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, the Personnel Hatch Area, the Primary Auxiliary Building, the Tank Farm, and the Waste Process Building provide for seismic separation.	10CFR54.4 (a)(1)
The Control Building and Diesel Generator Building, the Emergency Feedwater Pump Building, the Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, the Primary Auxiliary Building, and the Tank Farm provide shelter and protection to safety-related components.	10CFR54.4 (a)(1)

The Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, the Primary Auxiliary Building, the Tank Farm, and the Waste Process Building provide shielding against radiation.	10CFR54.4 (a)(1)
The Fuel Storage Building and parts of the Primary Auxiliary Building provide a pressure boundary or essentially leak tight barrier to protect public health and safety.	10CFR54.4 (a)(1)
The Control Building and Diesel Generator Building, the Emergency Feedwater Pump Building, the Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, the Primary Auxiliary Building, and the Tank Farm provide structural support to safety-related components.	10CFR54.4 (a)(1)
The Control Building and Diesel Generator Building minimizes inleakage by maintaining positive pressure in Control Building.	10CFR54.4(a)(2)
The Control Building and Diesel Generator Building, the Emergency Feedwater Pump Building, the Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, the Personnel Hatch Area, the Primary Auxiliary Building, the Tank Farm, and the Waste Process Building provide flood protection barrier.	10CFR54.4(a)(2)
The Control Building and Diesel Generator Building, the Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, and the Primary Auxiliary Building provide shielding against high energy line breaks (HELB).	10CFR54.4(a)(2)
The Containment Equipment Hatch Missile Shield, the Control Building and Diesel Generator Building, the Emergency Feedwater Pump Building, the Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, the Personnel Hatch Area, the Primary Auxiliary Building, and the Tank Farm provide missile barriers.	10CFR54.4(a)(2)

The Control Building and Diesel Generator Building, the Emergency Feedwater Pump Building, the Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, the Personnel Hatch Area, the Primary Auxiliary Building, the Tank Farm, and the Waste Process Building provide structural or functional support to non safety-related components.	10CFR54.4(a)(2)
The Control Building and Diesel Generator Building, the Emergency Feedwater Pump Building, the Main Steam and Feedwater Pipe Chases, the Primary Auxiliary Building, and the Tank Farm provide support and protection to the systems, structures, and components that are required for 10 CFR 50.62 (Automatic Trip Without Scram).	10CFR54.4(a)(3)
The Emergency Feedwater Pump Building, the Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, the Primary Auxiliary Building, and the Tank Farm provide support and protection to the systems, structures, and components that are required for 10 CFR 50.49 (Environmental Qualification).	10CFR54.4(a)(3)
The Control Building and Diesel Generator Building, the Emergency Feedwater Pump Building, the Fuel Storage Building, the Main Steam and Feedwater Pipe Chases, the Personnel Hatch Area, the Primary Auxiliary Building, the Tank Farm, and the Waste Process Building provide support and protection to the systems, structures, and components that are required for 10 CFR 50.48 (Fire Protection).	10CFR54.4(a)(3)
The Control Building and Diesel Generator Building, the Emergency Feedwater Pump Building, the Main Steam and Feedwater Pipe Chases, and the Primary Auxiliary Building provide support and protection to the systems, structures, and components that are required for 10 CFR 50.63 (Station Blackout).	10CFR54.4(a)(3)

UFSAR Reference

Additional details of the Primary Structures System are provided in the Seabrook Station Updated Final Safety Analysis Report (UFSAR) Sections 1.2.2, 2.4, 3.6, 3.8, 9.1, 12.3, and Table 3.7(B)-22.

License Renewal Drawings

- LR-001.

Components Subject to an Aging Management Review

LRA Table 2.4.5 lists the components and commodity groups of the Primary Structures System that require aging management review, including their intended function(s).

LRA Table 3.5.2.5 provides a summary of the results of the aging management review for the Primary Structures System.

Table 2.4.5

Primary Structures

Component/Commodity Type	Intended Function
ALUMINUM IN AIR – INDOOR UNCONTROLLED	Fire Barrier
ALUMINUM IN AIR WITH BORATED WATER LEAKAGE	Fire Barrier
CONCRETE IN AIR – INDOOR UNCONTROLLED	Fire Barrier HELB Shielding Shielding Structural Support
CONCRETE IN AIR – OUTDOOR	Missile Barrier Shelter, Protection
CONCRETE BELOW GRADE/SOIL	Flood Barrier Structural Support
CONCRETE IN RAW WATER	Structural Support
CARBON STEEL IN AIR – INDOOR UNCONTROLLED	Fire Barrier Flood Barrier HELB Shielding Structural Support
CARBON STEEL IN AIR WITH BORATED WATER LEAKAGE	Fire Barrier Flood Barrier HELB Shielding Structural Support
CARBON STEEL IN AIR – OUTDOOR	Shelter, Protection Structural Support
ELASTOMER SEAL IN AIR - INDOOR UNCONTROLLED	Control Bldg Habitability Fire Barrier Flood Barrier Shelter, Protection Structural Pressure Barrier
ELASTOMER SEAL IN AIR - OUTDOOR	Expansion/Separation Shelter, Protection Structural Pressure Barrier

LUBRITE IN AIR - INDOOR UNCONTROLLED	Structural Support
NON-METALLIC FIRE PROOFING IN AIR - INDOOR UNCONTROLLED	Fire Barrier
ROOFING IN AIR - OUTDOOR	Shelter, Protection
STAINLESS STEEL IN AIR - INDOOR UNCONTROLLED	Structural Support
STAINLESS STEEL IN AIR - OUTDOOR	Structural Support
STAINLESS STEEL IN RAW WATER	Shelter, Protection
STAINLESS STEEL IN TREATED BORATED WATER	Shelter, Protection
STAINLESS STEEL IN AIR WITH BORATED WATER LEAKAGE	Structural Support
THERMAL INSULATION STAINLESS STEEL JACKETING IN AIR WITH BORATED WATER LEAKAGE	Structural Support
THERMAL INSULATION ALUMINUM STEEL JACKETING IN AIR WITH BORATED WATER LEAKAGE	Structural Support

2.4.6 SUPPORTS

Structures Description

Supports at Seabrook Station includes ASME & NON-ASME pipe restraints/supports, jet impingement barriers/shields (e.g., High Energy Line Break barriers), pipe whip restraints, supports for Tube Track, instrument tubing, miscellaneous mechanical equipment, electrical raceways and conduit, HVAC ducts, racks, panels, cabinets, enclosures for electrical equipment, junction boxes, platforms, grout under baseplates and fasteners for support or equipment anchorage and other miscellaneous structures, instrument and battery racks, support base plate pads (silicone caulking, ethafoam, elastomer, teflon and sealant compounds) for components and equipment that are in scope for license renewal or are located within structures containing safety related components.

The spent fuel pool storage racks are designed to maintain the spent fuel assemblies in a subcritical array during all credible storage conditions. The storage racks are divided into two regions with twelve free standing self-supporting racks. Region 1 has six racks with Boral and Region 2 has six racks with Boraflex. The Boral (poison sheets) in region 1 is used for the neutron-absorbing capacity for the criticality analyses. The Boraflex utilized in the Region 2 racks is not credited for the neutron-absorbing capacity in the criticality analyses and therefore will not be manage for reduction of neutron-absorbing.

The Snubber portion of the support structures are considered an active component and are not included in the License Renewal (LR) boundary.

Supports provide the connection between a system's equipment or component and a plant structural member (e.g. wall, floor, ceiling, column, or beam). They provide support for distributed loads (e.g. piping, tubing, HVAC ducting, conduit, cable trays) and localized loads (e.g. individual equipment). Specific types of equipment and components evaluated as part of this commodity group include:

- Pipe Supports/Restraints, Tube Track & Instrument Tubing Supports - Includes all items used for supporting and/or restraining piping and components, tube track & instrument tubing. The support boundary includes all the auxiliary steel back to the structure's surface, grout and anchor bolts.
- Equipment Supports - Includes structural steel, sliding surfaces, and fasteners (e.g., bolts, studs, nuts) that secure equipment to structures. Also includes Spent Fuel racks and Boral poison sheets, Reactor Pressure Vessel (RPV) supports, steam generator supports, pressurizer supports, and reactor coolant pump supports.

- HVAC Duct Supports - Includes structural steel and fasteners (e.g., bolts, studs, nuts) that support/attach ventilation duct to structures.
- Raceways - Generic component type that is designed specifically for holding electrical wires and cables, such as cable trays, exposed and inaccessible metallic conduit or wireways. Commodity assets for raceways include both the component and the component's support and attachment.
- Electrical Enclosures - Generic component type that contains electrical components such as conduit, panels, boxes, cabinets, consoles, and bus ducts. An electrical enclosure includes both the enclosure and its supports and attachments.
- Platform and Shielding Supports - Includes structural steel, fasteners (e.g., bolts, studs, nuts) that secure platforms to structures.

Supports in air with borated water leakage are in scope for boric acid corrosion in steel, galvanized steel, stainless steel, and aluminum for all types of support members (including safety and non-safety), welds, bolted connections and support anchorage to building structure. These Supports are incorporated as part of the carbon steel, stainless steel and aluminum commodities in the appropriate structures that contain borated water systems.

Structures Intended Functions

Provide structural support to safety-related components	10 CFR 54.4(a)(1)
Limit offsite exposure comparable to 10 CFR Part 100 guidelines	10 CFR 54.4(a)(1)
Provide structural support to non-safety related components	10 CFR 54.4(a)(2)
Provides shelter, support and protection for components required by the current licensing basis for the FP regulated event (10 CFR 50.48)	10 CFR 54.4(a)(3)
Provide support and protection for components required by the current licensing basis for EQ (10 CFR 50.49)	10 CFR 54.4(a)(3)
Provide support and protection for components required by the current licensing basis for ATWS regulated event (10 CFR 50.62)	10 CFR 54.4(a)(3)

Provide support and protection for components required by the current licensing basis for SBO regulated event (10 CFR 50.63)	10 CFR 54.4(a)(3)

UFSAR References

The Supports details are provided Sections 3.2, and 9.1 of the Seabrook Station Updated Final Safety Analysis Report or UFSAR.

License Renewal Boundary Drawings

There is no License Renewal Boundary Drawing for Supports.

Components Subject to an Aging Management Review

LRA Table 2.4-6 lists the components and commodity groups of the Supports that require aging management review, including their intended function(s).

LRA Table 3.5.2-6 provides a summary of the results of the aging management review for the Support.

Table 2.4-6
Supports

Component/Commodity Type	Intended Function
ALUMINUM IN AIR - INDOOR UNCONTROLLED	Structural Support
ALUMINUM IN AIR – WITH BORATED WATER LEAKAGE	Structural Support
BORAL, BORON STEEL IN TREATED WATER	Absorb Neutrons
CONCRETE IN AIR - INDOOR UNCONTROLLED	Structural Support
CONCRETE IN AIR - OUTDOOR	Structural Support
CARBON STEEL IN AIR - INDOOR UNCONTROLLED	Structural Support
CARBON STEEL IN AIR - WITH BORATED WATER LEAKAGE	Structural Support
CARBON STEEL IN AIR - OUTDOOR	Structural Support
ELASTOMER IN AIR - INDOOR UNCONTROLLED	Structural Support
LUBRITE IN AIR - INDOOR UNCONTROLLED	Structural Support
STAINLESS STEEL IN AIR - INDOOR UNCONTROLLED	Structural Support
STAINLESS STEEL IN AIR - WITH BORATED WATER LEAKAGE	Structural Support
STAINLESS STEEL IN RAW WATER	Structural Support
STAINLESS STEEL IN TREATED WATER	Structural Support

2.4.7 TURBINE BUILDING

Structure Description

The Turbine Building is a non seismic Category I structure which houses a turbine generator and associated condensers, pumps and feedwater heaters. The lube oil, secondary component cooling and service and instrument air systems are also located in the Turbine Building.

The Turbine Building, structure within the scope of license renewal supports an (a) 2 or (a) 3 function only. The structure does not support any safety related (a) 1 function.

The entire Turbine Building is designed against failure in the north-south direction. The south end is designed against failure in the east-west direction; an east-west failure in the north end will not affect any seismic Category I structures due to Tornado Wind and SSE Loads.

Structure Intended Functions

The Turbine Building is designed against collapse onto adjacent Category I Structures due to tornado wind or SSE loads	10 CFR 54.4(a)(2)
Provide support and protection for the systems, structures or components required for fire protection (10CFR50.48)	10 CFR 54.4(a)(3)
Provide support and protection for the systems, structures or components required for anticipated transients without scram (ATWS) events. (10CFR50.62)	10 CFR 54.4(a)(3)
Provide support and protection for the systems, structures or components that are required for station blackout (10CFR50.63)	10 CFR 54.4(a)(3)

UFSAR References

The Turbine Building details are provided in Sections, 1.2, 3, and Tables 3.3-4, and 3.7(B)-22 of the Seabrook Station Updated Final Safety Analysis Report or UFSAR.

License Renewal Drawings

- LR-001

Components Subject to an Aging Management Review

LRA Table 2.4-7 lists the components and commodity groups of the Turbine Building that require aging management review, including their intended function(s).

LRA Table 3.5.2-7 provides a summary of the results of the aging management review for the Turbine Building.

Table 2.4.7

Turbine Building

Component/Commodity Type	Intended Function
ALUMINUM BUS DUCTS IN AIR - INDOOR UNCONTROLLED	Structural Support
CARBON STEEL IN AIR - INDOOR UNCONTROLLED	Structural Support
CARBON STEEL IN AIR - OUTDOOR	Structural Support
CONCRETE MASONRY UNITS IN AIR - INDOOR UNCONTROLLED	Structural Support
CONCRETE IN AIR - INDOOR UNCONTROLLED	Structural Support
CONCRETE IN AIR - OUTDOOR	Structural Support
CONCRETE IN RAW WATER	Structural Support
FIRE PENETRATION IN AIR – INDOOR UNCONTROLLED	Fire Barrier
PENETRATION SEAL - OUTDOOR	Structural Support
ROOFING (EPDM) IN AIR - OUTDOOR	Shelter, Protection

2.4.8 WATER CONTROL STRUCTURES

Structures Description

The Water Control Structures are used for cooling water for the Ultimate Heat Sink.

Service Water Cooling Tower

The cooling tower is a seismic Category I structure that is composed of a concrete basin, pump rooms, electrical switchgear rooms and mechanical equipment rooms. The pump rooms house vertical centrifugal pumps. The cooling tower serves as an ultimate heat sink in the unlikely event that the cooling water tunnels are rendered inoperative. The cooling tower houses pumps, fans, water distribution system and nozzles. The switchgear rooms house the switchgear, substation, and motor control center for the cooling tower.

Service Water Pumphouse

The Service Water Pumphouse is seismic Category I structure which is adjacent to the Circulating Water Pumphouse. It contains the four service water pumps which are available for normal operation and for post-accident cooldown. The Circulating Water Pumphouse is designed so that its loss or collapse will not impair the Service Water Pumphouse or system.

Circulating Water Pumphouse

The Circulating Water Pumphouse concrete below elevation 21’-0 is a seismic Category I structure. The Circulating Water Pumphouse basin is integrally connected to the Service Water Pumphouse basin by a common east-west wall. The Circulating Water Pumphouse steel framing is evaluated to prove that the collapse will not impair the Service Water Pumphouse or system. It is composed of a forebay and three bays with a circulating water pump in each. Each pump bay also has one traveling screen. The three pumps supply cooling water to the condensers.

Structures Intended Functions

Service Water Cooling Tower provides the Ultimate Heat Sink source of cooling water.	10 CFR 54.4(a)(1)
Service Water Cooling Tower, Service Water Pumphouse and Circulating Water Pumphouse provide shelter and protection for safety-related systems and components.	10 CFR 54.4(a)(1)

Service Water Cooling Tower, Service Water Pumphouse and Circulating Water Pumphouse provide physical support for safety related components.	10 CFR 54.4(a)(1)
Service Water Cooling Tower and Service Water Pumphouse provide missile protection	10 CFR 54.4(a)(2)
Service Water Cooling Tower, Service Water Pumphouse and Circulating Water Pumphouse provide structural or functional support to non-safety related components that could effect safety related components.	10 CFR 54.4(a)(2)
Service Water Cooling Tower and Service Water Pumphouse provide support and protection for component functions credited in the current licensing bases for Fire Protection (10CFR 50.48	10 CFR 54.4(a)(3)
Service Water Pumphouse provides support and protection for component functions credited in the current licensing bases for Station Blackout (10CFR 50.63)	10 CFR 54.4(a)(3)

UFSAR References

The Water Control Structures details are provided in Sections 1.2, 3.8, and Tables 3.7(B)-22 and 3.3-4 of the Seabrook Station Updated Final Safety Analysis Report or UFSAR.

License Renewal Boundary Drawings

- LR-001

Components Subject to an Aging Management Review

LRA Table 2.4-8 lists the components and commodity groups of the Water Control Structures that require aging management review, including their intended function(s).

LRA Table 3.5.2-8 provides a summary of the results of the aging management review for the Water Control Structures.

Table 2.4-8
Water Control Structures

Component/Commodity Type	Intended Function
CONCRETE IN RAW WATER	Structural Support Ultimate Heat Sink
CARBON STEEL IN AIR – INDOOR UNCONTROLLED	Fire Barrier Structural Support
CARBON STEEL IN AIR – OUTDOOR	Shelter, Protection Structural Support
CARBON STEEL IN RAW WATER	Structural Support
CONCRETE BELOW GRADE/SOIL	Structural Support
CONCRETE IN AIR – INDOOR UNCONTROLLED	Fire Barrier Structural Support
CONCRETE IN AIR - OUTDOOR	Missile Barrier Shelter, Protection
ELASTOMER IN AIR - INDOOR UNCONTROLLED	Fire Barrier
ELASTOMER IN AIR - OUTDOOR	Shelter, Protection
ROOFING IN AIR – OUTDOOR	Shelter, Protection

2.5 SCOPING AND SCREENING RESULTS:ELECTRICAL AND INSTRUMENTATION AND CONTROLS (I&C) SYSTEMS/COMMODITY GROUPS

The determination of electrical/Instrumentation and Controls (I&C) systems within the scope of License Renewal is made through the application of the process described in Subsection 2.1.1. The results of the electrical/I&C systems scoping review are contained in Section 2.2.

Electrical/I&C commodity groups were formed using a "bounding" approach. In this approach, all electrical and instrumentation components were combined into groups (commodities) of similar function, similar design or similar materials of construction. This approach does not attempt to distinguish the component's function with regards to 10CFR 54.21 (a)(1), (a)(2) or (a)(3). By using this approach, all electrical/I&C components were reviewed as a group regardless of the system assigned to each component.

The components in the recovery path for loss of off site power due to a Station Blackout (SBO) are discussed in Section 2.5.3. These components are included based on their intended function.

Environmental Qualification (EQ) of Electric Components is evaluated as a Time Limited Aging Analysis (TLAA) in Section 4.4. All electrical and instrumentation and control (I&C) penetrations including assembly cables and connections at Seabrook Station are included in the EQ program. The pressure boundary function of the electrical and I&C penetrations is addressed as part of the Containment Structures in Section 2.4.

The interface of electrical/I&C components with other types of components and the assessments of these interfacing components are provided in the appropriate mechanical or structural sections. The evaluation of the following commodities is provided in the structural assessment documented in Section 2.4.

- Instrumentation Racks, Frames, Panels, and Enclosures
- Electrical Panels, Racks, Cabinets, and Other Enclosures
- Cable Trays and Supports
- Conduit and Supports
- Exterior Surfaces and Elastomers of Metal Enclosed Bus (MEB)
- Switchyard structural features required to support components required as part of the off site Alternating Current (AC) power recovery path

- In-scope electrical manholes and duct banks

2.5.1 COMMODITY GROUPS

The following electrical/I&C commodity groups were determined to be passive and long lived. These groups were evaluated to determine the groups that require aging management review:

- Electrical Cables and Connections
- Uninsulated Ground Conductors
- Cable Ties
- Metal Enclosed Bus
- Fuse Holders (Not Part of a Larger Assembly) Metallic Clamps
- Cable Connections (Metallic Parts)
- SF_6 Insulated Bus, Connections and Insulators

NEI 95-10 Appendix B and NUREG-1800 Table 2.1-5 identified other commodity groups that are classified as passive. The following is a discussion of why those groups are excluded.

- High Voltage Insulators
- Switchyard bus
- Transmission conductors
- Segregated phase bus

The Seabrook Station connects to the off site power grid via a Sulfur Hexafluoride (SF_6) switchyard. This type of switchyard does not include high voltage insulators, switchyard bus or transmission conductors that are typically associated with open air switchyards. For this reason, high voltage insulators, switchyard bus and transmission conductors are not included in the review.

Seabrook Station does not use segregated phase bus.

2.5.2 ELECTRICAL / I&C COMMODITY GROUP EVALUATIONS

The following is a detailed evaluation of each passive long lived commodity group.

2.5.2.1 Non-EQ Electrical Cables and Connections

All electrical insulated cables and connections not subject to environmental qualification requirements of 10 CFR 50.49 are included in this group.

The types of insulated connections included in this review are splices, connections, insulating material of fuse holders and terminal blocks.

The intended function of this group is to provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals.

2.5.2.2 Uninsulated Ground Conductors

Uninsulated ground conductors bond metal raceways, building structural steel, and plant equipment to earth ground through an installed ground grid. The uninsulated ground conductors are nonsafety-related and provide for personnel and equipment protection. In the event of a fault in an electrical circuit or component, the ground conductors provide a direct path to ground for the fault currents to minimize equipment damage. The ground conductors do not prevent faults and are not required for equipment operation. Failure of a ground conductor cannot affect the accomplishment of any license renewal intended functions. Therefore, un-insulated ground conductors do not perform a license renewal intended function and are not within the scope of license renewal and are not subject to an Aging Management Review (AMR).

2.5.2.3 Cable Tie Wraps

The intended functions of cable ties have been the subject of recent industry discussions. Seabrook Station performed a review of cable tie applications. The review concluded that failure of cable ties will not prevent in-scope electrical conductors from performing their intended function. Therefore, an AMR is not required for cable ties installed at Seabrook Station.

2.5.2.4 Metal Enclosed Bus

Metal Enclosed Bus is bus that is not part of an active component such as switchgear, load centers or motor control centers. For Seabrook Station these include:

- Isolated Phase Bus
- Non-Segregated Phase Bus

The intended function for all items except the Metal Enclosed Bus insulators is to provide electrical connections to specified sections of an electrical circuit to deliver voltage or current.

The intended function of Metal Enclosed Bus insulators is to insulate and support an electrical conductor.

2.5.2.5 Fuse Holders (Not Part of a Larger Assembly) Metallic Clamps

All fuse holders which are part of larger assemblies are managed as part of the active component. Fuse holders located in enclosures without active components are subject to an AMR. Seabrook Station has identified panels which contain in-scope fuses that are subject to an AMR.

The intended function is to provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals.

2.5.2.6 Cable Connections (Metallic Parts)

Insulated portions of electrical connections are included with the commodity groups Non-EQ Electrical Cable and Connections.

The various metals used for Cable Connections (Metallic Parts) of electrical connections are evaluated separately. This component type includes the metallic portions of cable connections. This commodity group includes external connections terminating at an active or passive device. The components in this group are subject to an AMR.

The intended function of this group is to provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals.

2.5.2.7 SF_6 Insulated Bus, Connections and Insulators

Section 2.5.3 provides a description of the SF_6 insulated bus and the components in the Station Blackout (SBO) recovery path. SF_6 gas provides the insulating media for the bus.

The SF_6 gas, connections, insulators and the pressure boundary which contains the gas are subject to an AMR.

The intended function for the SF_6 insulated bus and connections are to provide electrical connections to specified sections of an electrical circuit to deliver voltage or current. The intended function of the SF_6 bus insulators is to insulate and support an electrical conductor.

2.5.3 SBO RECOVERY PATH DISCUSSION

Seabrook Station performed additional screening for components which are relied on for restoration of offsite power.

To restore offsite power after an SBO event, two possible recovery paths are identified and the path includes the Seabrook Station switchyard 345 kilovolt (kV) power circuit breakers. The electrical components in these paths were considered in the scope of License Renewal (LR) based on their intended function. The components are shown on Figure 2.5-1, SBO Offsite Recovery Path License Renewal Drawing.

The first path includes all components required to restore offsite power from the 345 kV Switchyard Power Circuit Breakers through the Unit Auxiliary Transformers (UAT) to the diesel backed 4160 volt (V) emergency buses. This path includes the SF_6 bus from 345 kV Power Circuit Breakers 11 and 163 to the Generator Step Up (GSU) transformer, the Isolated phase bus from the GSU to the UAT's, and the non-segregated bus from the UATs to 4160 V Bus E5 (EDE-SWG-5) and E6 (EDE-SWG-6).

The second path includes the SF_6 bus from 345 kV Power Circuit Breakers 52 and 695 to the Reserve Auxiliary Transformers (RAT's), and the non-segregated bus from the RAT's to 4160 V Bus E5 (EDE-SWG-5) and E6 (EDE-SWG-6).

Based on their intended functions, the passive long lived devices in the SBO recovery path are in scope and require an AMR. The MEB passive devices include the non-segregated bus, isolated phase bus, and electrical cables and connections. Because of the unique design, the SF_6 bus and the SF_6 bus insulators are discussed separately.

The design and operation of the Seabrook Station switchyard is significantly different from a traditional open air switchyard. Seabrook Station connects to the off site power grid via the 345kV SF_6 Switchyard. The switchyard consists of SF_6 insulated bus duct, disconnect switches, power circuit breakers and protective relays. The SF_6 switchyard is an enclosed system that is different from the traditional overhead type systems. The SF_6 system design does not incorporate transmission lines, high voltage insulators, or exposed switchyard bus.

The SF_6 buses are phase-isolated. Each SF_6 insulated bus consists of a tubular conductor that is surrounded by a concentric metal enclosure filled with SF_6 gas. The tubular conductor is centered within the enclosure by a conical 345kV epoxy insulator. The SF_6 gas provides additional insulation between the bus and the exterior housing.

2.5.4 ELECTRICAL / I&C COMMODITY GROUPS SUBJECT TO AGING MANAGEMENT REVIEW

The following electrical/I&C component groups require an AMR:

- Non-EQ Electrical Cables and Connections

  This commodity group includes non-EQ cables and connections, connectors, electrical splices, fuse holders, terminal blocks, power cables, control cables, instrument cables, insulated cables and communication cables.

- Metal Enclosed Bus

  This commodity group includes isolated phase bus and non-segregated phase bus.

- Fuse Holders (Not Part of a Larger Assembly) Metallic Clamps

  This commodity group includes the metallic clamps of fuse holders that are located in enclosures that do not contain active devices.

- Cable Connections (Metallic Parts)

  This commodity group includes the metallic portions of electrical connections which terminate to an active or passive device. Wiring connections internal to an active assembly are considered a part of the active assembly and therefore are not included in the group.

  Connections exposed to borated water are included in this commodity group.

- SF_6 Insulated Bus, Connections and Insulators

The portions of the SF_6 bus required to recover off site power as shown on License Renewal Figure 2.5-1 are subject to an AMR.

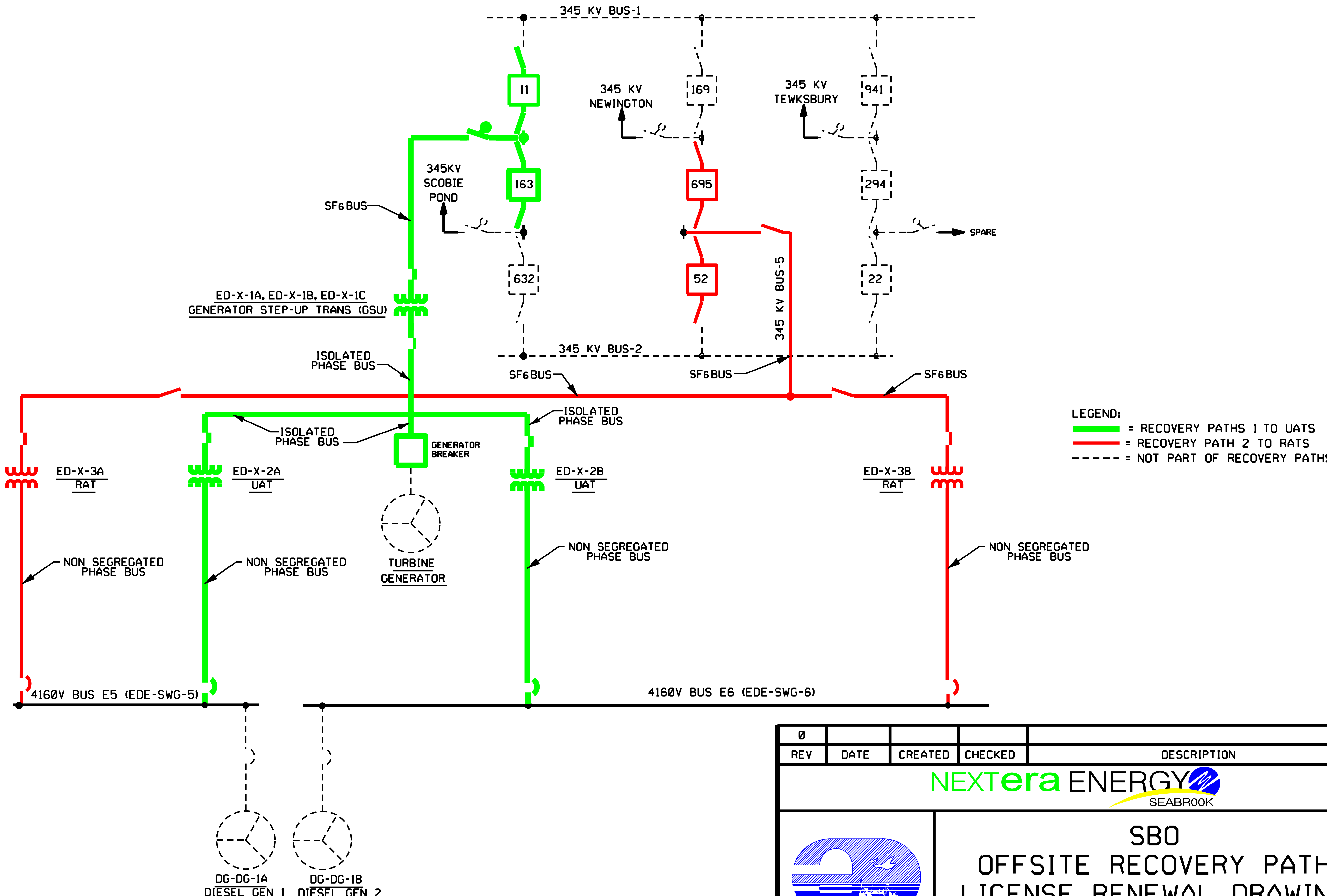
Table 2.5.4-1 summarizes the results of the scoping and screening effort by including the commodity groups and the intended function of those groups which are subject to an AMR.

TABLE 2.5.4-1

Component / Commodity Types Subject to Aging Management Review

Component / Commodity Type	Intended Function
Non-EQ Electrical Cables and Connections	Electrical Continuity
Metal Enclosed Bus	Electrical Continuity Insulation-Electrical
Fuse Holders (Not Part of a Larger Assembly) Metallic Clamp	Electrical Continuity
Cable Connections (Metallic Parts)	Electrical Continuity
SF_6 Insulated Bus, Connections and Insulators	Electrical Continuity Insulation-Electrical

The aging management review results are provided in Table 3.6.2-1.



0				
REV	DATE	CREATED	CHECKED	DESCRIPTION

NEXTera ENERGY SEABROOK

SEABROOK STATION

SBO
OFFSITE RECOVERY PATH
LICENSE RENEWAL DRAWING

FIGURE 2.5-1

03/30/10

CHAPTER 3

AGING MANAGEMENT REVIEW RESULTS

3.0 AGING MANAGEMENT REVIEW RESULTS

This Section provides the results of the Aging Management Review (AMR) for those structures and components identified in Section 2 as being subject to aging management review.

The methodology used to perform AMR's is summarized in Subsection 3.0.1 below. The AMRs demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the Current Licensing Basis (CLB) for the period of extended operation as required by 10 CFR 54.21(a)(3).

3.0.1 AMR METHODOLOGY

Seabrook Station structure and component aging management reviews were performed using a methodology consistent with NEI 95-10, Revision 6.

Where beneficial for the AMR process, Seabrook Station's components were grouped into component type groups, or "component groups", within a given Seabrook Station License Renewal Application (LRA) system or structure. For the purposes of aging evaluations, these component groups were sometimes further consolidated based upon distinct combinations of material and environment. These groupings may include various component types from several LRA systems or structures.

The AMR methodology utilized industry reports to identify a set of applicable aging effects for Seabrook Station components and structures.

The components requiring an AMR for each Seabrook Station LRA system or structure were evaluated to determine the applicability of the aging effects identified by the industry report review. The result of this evaluation was a set of aging effects requiring management for each structure, component, or component group. The evaluation addresses differences between the Seabrook Station design, materials of construction, environment parameters and the assumptions contained within the industry guidance documents. Seabrook Station plant specific operating experience was also considered in the evaluation.

One or more Aging Management Programs (AMP's) were identified for each component or structure with an aging effect requiring management. The attributes of each AMP were evaluated to ensure that the aging effects will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation. When necessary, existing Seabrook Station programs were enhanced or new Seabrook Station programs were created.

3.0.2 AMR RESULTS TABLE STRUCTURE

The subsections of Section 3 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 (I & C) Components

Descriptions of the internal and external service environments that were used in the aging management review to determine aging effects requiring management are included in Tables 3.0-1, 3.0-2 and 3.0-3, Seabrook Station Service Environments. The environments used in the aging management reviews are listed in the Environment column.

The Aging Management Review results information in Section 3 is presented in one of the two tables described in 3.0.2.2.

3.0.2.1 Table Descriptions

The AMR Results information in Section 3 is presented in the following two table types:

Table 3.X.1

The following describes the numbering sequence for Table 3.X.1 where ‘3’ indicates the LRA Chapter number, ‘X’ indicates the subsection number from NUREG 1801, Volume 1 and ‘1’ indicates that this is the first table type in Section 3.

The purpose of Table 3.X.1 is also to provide a summary comparison of how the facility aligns with the corresponding tables of NUREG-1801, Volume 1. The table is essentially the same as Tables 3.1.1 through 3.6.1 provided in NUREG-1801, Volume 1, except that the “ID” and “Type” columns have been replaced by an “Item Number” column. 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 3.X.2-Y to Table 3.X.1. The “Discussion” column is used to provide 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 is located

- The name of a plant specific aging management program being used
- Exceptions to the NUREG-1801 assumptions
- A discussion of how the line is consistent with the corresponding line item in NUREG-1801, Volume 1, when that may not be intuitively obvious
- A discussion of how the item is different than the corresponding line item in NUREG- 1801, Volume 1, when it may appear to be consistent (e.g., when there is exception taken to an aging management program that is listed in NUREG-1801, Volume 1)

The format of Table 3.X.1 provides the reviewer with a means of aligning a specific Table 3.X.1 row with the corresponding NUREG-1801, Volume 1 table row, thereby allowing for the ease of checking consistency.

Table 3.X.2-Y

The following describes the numbering sequence for Table 3.X.2-Y where ‘3’ indicates the LRA Section number, ‘X’ indicates the subsection number from NUREG 1801, Volume 1, ‘2’ indicates that this is the second Table type in Section 3, and ‘Y’ indicates the table number for a specific system.

Table 3.X.2-Y provides the detailed results of the aging management reviews for those structures and component types identified in LRA Chapter 2 as being subject to aging management review. There will be a Table 3.X.2-Y for each of the systems within a Chapter 3 Section grouping.

Table 3.X.2-Y consists of the following nine columns:

- Component Type
- Intended Function
- Material
- Environment
- Aging Effect Requiring Management
- Aging Management Program
- NUREG-1801 Volume 2 Item
- Table 3.X.1 Item
- Note

Component Type – The first column identifies all of the component types from Section 2 of the LRA that are subject to aging management review. They are listed in alphabetical order.

Intended Function – The second column contains the license renewal intended function(s) for the listed component types. Definitions of intended functions are contained in Table 2.1-1.

Material – The third column lists the particular materials of construction for the component type.

Environment – The fourth column lists the environment to which the component types are exposed. Internal and external service environments are indicated and a list of these environments is provided in Tables 3.0-1, 3.0-2, and 3.0-3.

Aging Effect Requiring Management – As part of the aging management review process, the aging effects required to maintain the intended function of the component type are identified for the material and environment combination. These aging effects requiring management are listed in the fifth column.

Aging Management Program – The aging management programs used to manage the aging effects requiring management are listed in the sixth column of Table 3.X.2-Y. Aging management programs are described in Appendix B.

NUREG-1801, Vol. 2 Item – Each combination of component type, material, environment, aging effect requiring management and aging management program that is listed in Table 3.X.2-Y is compared to NUREG-1801, Volume 2, with consideration given to the standard notes to identify consistency. Consistency is documented by noting the appropriate NUREG-1801, Volume 2 item number in the seventh column of Table 3.X.2-Y. If there is no corresponding item number in NUREG-1801, Volume 2, this cell block is "None". Thus, a reviewer can readily identify the correlation between the plant-specific tables and the NUREG-1801, Volume 2 tables.

Table 3.X.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 3.X.1 is listed in the eighth column of Table 3.X.2. If there is no corresponding item in NUREG-1801, Volume 1, the word "None" is placed in the column. Table 3.X.1 Item allows the information from the two tables to be correlated.

Note – The notes provided in Table 3.X.2-Y describe how the information in the table aligns with the information in NUREG-1801. Table 3.X.2-Y contains both standard lettered notes and plant-specific numbered notes.

The standard lettered notes, e.g., A, B, C, etc., provide standard information regarding comparison of the Seabrook Station aging management review results with the NUREG-1801, Volume 2 Aging Management table line item identified in the seventh column. In addition to the standard lettered notes, numbered plant-specific notes provide additional clarifying information when appropriate. If a comparison to a NUREG-1801 Volume 2 item does not exist, Column 8 is marked “None.”

Plant-Specific notes contain Seabrook Station plant-specific information and clarifications of AMR results. Plant-Specific notes are numerically labeled using a number that correlates to the corresponding AMR Results section. The plant specific notes are numbered sequentially for each table.

The Standard and Plant-Specific notes applicable for LRA Sections 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6 are shown at the end of each of these Sections.

3.0.2.2 Table Usage

Table 3.X.1

Table 3.X.1 Component, Aging Effect, Aging Management Programs and Further Evaluation columns are taken directly from NUREG-1801, Volume 1. The Discussion column summarizes how the Seabrook Station evaluations and aging management programs align with NUREG-1801, Volume 1.

Table 3.X.2-Y

Table 3.X.2 contains the Seabrook Station AMR results. Each Table 3.X.2-Y row represents a component type, material, environment, aging effect requiring management and aging management program combination within a Seabrook Station system or structure. If there is a correlation between a Seabrook Station AMR results item and a NUREG-1801, Volume 2 item, then the NUREG-1801, Volume 2 item will appear in Column 8. If Column 8 is “None”, a comparable NUREG-1801, Volume 2 item was not identified.

If a NUREG-1801, Volume 2 item is identified in Column 8, a Table 3.X.1 row number will be shown in Column 8. Table 3.X.1 row number referenced represents the “roll-up” location for the Table 3.X.2-Y item.

3.0.2.3 Further Evaluation Text

For Table 3.X.1, “Summary of Aging Management Programs”, items where NUREG-1801, Volume 1 recommends “further evaluation”, separate text sections are provided. These text sections summarize the Seabrook Station AMR results as they relate to the issue raised in the applicable “further evaluation recommended” section of NUREG-1800. The Seabrook Station LRA “Further Evaluation” section numbering aligns with the applicable issue text in Section 3 of NUREG-1800.

3.0.3 OPERATING EXPERIENCE

Seabrook Station site-specific and industry operating experience was reviewed. The review was based on a keyword search of the Corrective Action Program. Operating experience from the previous ten (10) years was reviewed. The site specific and industry operating experience included a review of:

- Corrective Action Program Reports
- Input from System Engineers

No new aging effects were identified during this review. In addition, each aging management program contains a discussion of the operating experience relevant to that program.

Industry operating experience has been captured in NUREG-1801. An evaluation of industry operating experience published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. No additional aging effects requiring management were identified beyond those identified during the aging management review process.

Ongoing review of plant-specific and industry operating experience is performed in accordance with the plant Operating Experience Program and as a part of selected Seabrook Station aging management programs.

Table 3.0-1
Seabrook Station Service Environments
for Mechanical Aging Management Reviews

Environment	**Description**
Air-Indoor Controlled	The environment to which the specified internal or external surface of the component or structure is exposed: indoor air in a humidity controlled (e.g., air conditioned) environment.
Air-Indoor Uncontrolled	Indoor air on systems with temperatures higher than the dew point, i.e., condensation can occur but only rarely, equipment surfaces are normally dry.
Air-Outdoor	The outdoor environment consists of moist, possibly salt laden atmospheric air, ambient temperatures and humidity, and exposure to weather, including precipitation and wind. The component is exposed to air and local weather conditions, including salt water spray where applicable. A component is considered susceptible to a wetted environment when it is submerged, has the potential to pool water or is subject to external condensation.
Air with Borated Water Leakage	Air and untreated borated water leakage on indoor systems with temperatures above or below the dew point. The water from leakage is considered to be untreated, due to the potential for water contamination at the surface.
Air with Metal Temperature up to 288 °C (550 °F)	Metal temperature up to 288°C (550°F).
Air with Reactor Coolant Leakage	Reactor coolant leakage on high temperature systems.
Closed Cycle Cooling Water	Treated water subject to the closed cycle cooling water chemistry program.

Environment	**Description**
Closed Cycle Cooling Water >140°F	Closed Cycle Cooling Water >140 °F is Closed Cycle Cooling Water that has a temperature greater than140 °F. This environment is only used for stainless steel components subject to stress corrosion cracking.
Concrete	Components embedded in concrete.
Condensation	The environment to which the internal or external surface of the component or structure is exposed. Condensation on the surfaces of systems with temperatures below the dew point is considered raw water due to potential for surface contamination.
Diesel Exhaust	Gases, fluids and particulates present in diesel engine exhaust.
Dried Air	Air that has been treated to reduce the dew point well below the system operating temperature.
Fuel Oil	Fuel Oil includes fuel oil for the emergency diesel generators, diesel-driven fire pumps, and fire pump house boiler. Water contamination of fuel is possible.
Gas	Internal gas environments from dry air, inert or nonreactive gases.
Lubricating Oil	Lubricating oils are low-to-medium viscosity hydrocarbons used for bearing, gear and engine lubrication with the possibility of containing contaminants and water.

Environment	**Description**
Raw Water	Raw, untreated fresh, salt, potable, or ground water. Building floor drains, and sumps may be exposed to a variety of untreated water that is thus, classified as raw water, for the determination of aging effects. Raw water may contain contaminants including oil and boric acid, depending on the location, as well as originally treated water that is not monitored by a chemistry program.
Reactor Coolant	Water in the Reactor Coolant System and connected systems at or near full operating temperature.
Reactor Coolant >250 °C (>482 °F)	Reactor Coolant above thermal embrittlement threshold for Cast Austenitic Stainless Steel (CASS).
Reactor Coolant and Neutron Flux	The Reactor Coolant and Neutron Flux environment consists of the Reactor Coolant environment in addition to component exposure to neutron fluence projected to exceed 1.0×10^{17} n/cm^2 at the end of the license renewal term.
Secondary Feedwater/Steam	Feedwater or steam at or near full operating temperature, subject to the secondary water chemistry program.
Soil	Soil is used for components that are buried in soil.
Steam	Steam environment consists of steam that is subject to chemistry controls set by the Water Chemistry Program.
System Temperature up to 340°C (644°F)	Maximum metal temperature <340°C (644°F).
Treated Borated Water	Treated Borated Water is a controlled water system.

Environment	Description
Treated Borated Water >140 °F	Treated Borated Water >140 °F is Treated Borated Water that has a temperature greater than 140 °F. This environment is only used for stainless steel components subject to stress corrosion cracking.
Treated Water	Treated Water is demineralized water which is the base water for all clean systems. Depending on the system, this demineralized water may require additional processing.
Treated Water >60°C (>140°F)	Treated Water >140 °F is Treated Water that has a temperature greater than 140 °F. This environment is only used for stainless steel components subject to stress corrosion cracking.

Table 3.0-2
Seabrook Station Service Environments
for Civil Aging Management Reviews

Environment	**Description**
Air-Indoor Uncontrolled	Indoor air on systems with temperatures higher than the dew point, i.e., condensation can occur but only rarely, equipment surfaces are normally dry.
Air-Outdoor	The outdoor environment consists of moist, possibly salt laden atmospheric air, ambient temperatures and humidity and exposure to weather, including precipitation and wind. The component is exposed to air and local weather conditions, including salt water spray where applicable. A component is considered susceptible to a wetted environment when it is submerged, has the potential to pool water or is subject to external condensation.
Air with Borated Water Leakage	Air and untreated borated water leakage on indoor systems with temperatures above or below the dew point. The water from leakage is considered to be untreated due to the potential for water contamination at the surface.
Ground Water/Soil	Groundwater is the water beneath the surface that can be collected with wells, tunnels, or drainage galleries or that flows naturally to the earth's surface via seeps or springs. Soil is a mixture of inorganic materials produced by the weathering of rocks, and clays and organic material produced by the decomposition of vegetation.

Environment	Description
Raw Water	Raw, untreated fresh, salt, potable or ground water. Building floor drains, and sumps may be exposed to a variety of untreated water that is thus classified as raw water, for the determination of aging effects. Raw water may contain contaminants, including oil and boric acid depending on the location, as well as originally treated water that is not monitored by a chemistry program.
Soil	Soil is used for components that are buried in soil.
Treated Borated Water	Borated Pressurized Water Reactor (PWR) water is a controlled water system.

Table 3.0-3
Seabrook Station Service Environments
for Electrical and Instrumentation & Controls Aging Management Reviews

Environment	Description
Adverse localized environment	The conductor insulation used for electrical cables in instrumentation circuits can be subjected to an adverse localized environment. This can be represented within a specific GALL AMR line item as being due to any of the following: (1) exposure to moisture and voltage (2) heat, radiation or moisture in the presence of oxygen (3) heat, radiation or moisture in the presence of oxygen or >60-year service limiting temperature, or (4) adverse localized environment caused by heat, radiation, oxygen, moisture or voltage. The term ">60-year service limiting temperature" refers to that temperature that exceeds the temperature below which the material has a 60-year or greater service lifetime.
Air-Indoor	Uniquely used for electrical systems, Air-Indoor is synonymous with "Air-Indoor Uncontrolled (internal/external)." Indoor air on systems with temperatures higher than the dew point, i.e., condensation can occur but only rarely, equipment surfaces are normally dry.
Air-Indoor Controlled	The environment to which the specified internal or external surface of the component or structure is exposed: indoor air in a humidity controlled (e.g., air conditioned) environment.
Air-Indoor Uncontrolled	Indoor air on systems with temperatures higher than the dew point, i.e., condensation can occur but only rarely, equipment surfaces are normally dry.

Environment	Description
Air-Outdoor	The outdoor environment consists of moist, possibly salt laden atmospheric air, ambient temperatures and humidity, and exposure to weather, including precipitation and wind. The component is exposed to air and local weather conditions, including salt water spray, where applicable. A component is considered susceptible to a wetted environment when it is submerged, has the potential to pool water or is subject to external condensation.
Air with Borated Water Leakage	Air and untreated borated water leakage on indoor systems with temperatures above or below the dew point. The water from leakage is considered to be untreated due to the potential for water contamination at the surface.
Gas	Internal gas environments from dry air, inert or nonreactive gases.

3.1 AGING MANAGEMENT OF REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

3.1.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.1, Reactor Vessel, Internals, and Reactor Coolant System, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- Reactor Coolant System (2.3.1.1)
- Reactor Vessel (2.3.1.2)
- Reactor Vessel Internals (2.3.1.3)
- Steam Generator (2.3.1.4)

3.1.2 RESULTS

The following tables summarize the results of the aging management review for Reactor Vessel, Internals and Reactor Coolant System:

Table 3.1.2-1	Summary of Aging Management Evaluation – Reactor Coolant System
Table 3.1.2-2	Summary of Aging Management Evaluation – Reactor Vessel
Table 3.1.2-3	Summary of Aging Management Evaluation – Reactor Vessel Internals
Table 3.1.2-4	Summary of Aging Management Evaluation – Steam Generator

3.1.2.1 Materials, Environments, Aging Effects Requiring Management and Aging Managements Programs

3.1.2.1.1 Reactor Coolant System

Materials

The materials of construction for the Reactor Coolant System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS

- Nickel Alloy
- Stainless Steel
- Steel
- Steel with Stainless Steel Cladding

Environments

Components of the Reactor Coolant System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Air with Metal Temperature up to 288 °C (550 °F)
- Air with Reactor Coolant Leakage
- Closed Cycle Cooling Water
- Gas
- Reactor Coolant
- Reactor Coolant >250 °C (>482 °F)
- System Temperature up to 340°C (644°F)
- Treated Borated Water
- Treated Borated Water >140 °F
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Reactor Coolant System components and commodities require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Fracture Toughness

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Reactor Coolant System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program (B2.1.1)
- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Nickel-Alloy Nozzles and Penetrations Program (B.2.2.3)
- One-Time Inspection Program (B.2.1.20)
- One-Time Inspection of ASME Code Class 1 Small Bore Piping Program (B.2.1.23)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.1.2-1, Summary of Aging Management Evaluation – Reactor Coolant System, summarizes the results of the aging management review for the Reactor Coolant System.

3.1.2.1.2 Reactor Vessel

Materials

The materials of construction for the Reactor Vessel components requiring aging management review are:

- Nickel Alloy
- Stainless Steel

- Steel
- Steel with Stainless Steel Cladding

Environments

Components of the Reactor Vessel are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Air with Reactor Coolant Leakage
- Reactor Coolant
- Reactor Coolant and Neutron Flux

Aging Effects Requiring Management

The following aging effects associated with the Reactor Vessel components and commodities require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Reactor Vessel components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program (B.2.1.1)
- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Control Program (B.2.1.4)
- Nickel-Alloy Nozzles and Penetrations Program (B.2.2.3)

- Nickel-Alloy Penetration Nozzles Welded to the Upper RV Closure Heads of PWRs Program (B.2.1.5)
- Reactor Head Closure Studs Program (B.2.1.3)
- Reactor Vessel Surveillance Program (B.2.1.19)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.1.2-2, Summary of Aging Management Evaluation – Reactor Vessel, summarizes the results of the aging management review for the Reactor Vessel.

3.1.2.1.3 Reactor Vessel Internals

Materials

The materials of construction for the Reactor Vessel Internals components requiring aging management review are:

- Nickel Alloy
- Stainless Steel

Environments

Components of the Reactor Vessel Internals are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Reactor Coolant
- Reactor Coolant and Neutron Flux

Aging Effects Requiring Management

The following aging effects associated with the Reactor Vessel Internals components and commodities require management:

- Changes in Dimensions
- Cracking

- Cumulative Fatigue Damage
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Reactor Vessel Internals components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program (B.2.1.1)
- PWR Vessel Internals Program (B.2.1.7)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.1.2-3, Summary of Aging Management Evaluation – Reactor Vessel Internals, summarizes the results of the aging management review for the Reactor Vessel Internals.

3.1.2.1.4 Steam Generator

Materials

The materials of construction for the Steam Generator components requiring aging management review are:

- Nickel Alloy
- Stainless Steel
- Steel
- Steel with Nickel Alloy Cladding
- Steel with Stainless Steel Cladding

Environments

Components of the Steam Generator are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Air with Reactor Coolant Leakage
- Reactor Coolant
- Secondary Feedwater/Steam
- System Temperature Up To 340°C (644°F)

Aging Effects Requiring Management

The following aging effects associated with the Steam Generator components and commodities require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer
- Wall Thinning

Aging Management Programs

The following programs manage the aging effects requiring management for the Steam Generator components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program (B.2.1.1)
- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Flow-Accelerated Corrosion Program (B.2.1.8)
- Steam Generator Tube Integrity Program (B.2.1.10)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.1.2-4, Summary of Aging Management Evaluation – Steam Generator, summarizes the results of the aging management review for the Steam Generator.

3.1.2.2 AMR Results for Which Further Evaluation is Recommended by the GALL Report

NUREG-1800 indicates that further evaluation is necessary for certain aging effects, particularly those that require plant specific programs. Section 3.0 of NUREG-1800 discusses these aging effects that require further evaluation. The following sections are numbered in accordance with the discussions in Section 3.0 of NUREG-1800 and explain Seabrook Station's approach to these areas requiring further evaluation.

3.1.2.2.1 Cumulative Fatigue Damage

Fatigue is 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). This TLAA is addressed separately in Section 4.3, "Metal Fatigue Analysis," of this SRP-LR.

At Seabrook Station, the evaluation of metal fatigue as a TLAA for the Chemical and Volume Control System, Reactor Coolant System, Reactor Vessel, Reactor Vessel Internals, Residual Heat Removal System, Safety Injection System, and Steam Generator is discussed in Section 4.3.

3.1.2.2.2 Loss of Material due to General, Pitting, and Crevice Corrosion

1. *Loss of material due to general, pitting, and crevice corrosion could occur in the steel PWR steam generator shell assembly exposed to secondary feedwater and steam. Loss of material due to general, pitting, and crevice corrosion could also occur for the steel top head enclosure (without cladding) top head nozzles [vent, top head spray or reactor core isolation cooling (RCIC), and spare] exposed to reactor coolant. The existing program relies on control of reactor water chemistry to mitigate corrosion. However, control of water chemistry does not preclude loss of material due to pitting and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of the chemistry control program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is*

progressing very slowly such that the component's intended function will be maintained during the period of extended operation.

Item Number 3.1.1-11 is applicable to BWRs only and is not used for Seabrook Station.

Item Number 3.1.1-12 is applicable to (Once Through) Steam Generators, which are not used at Seabrook Station.

2. *Loss of material due to pitting and crevice corrosion could occur in stainless steel BWR isolation condenser components exposed to reactor coolant. Loss of material due to general, pitting, and crevice corrosion could occur in steel BWR isolation condenser components. The existing program relies on control of reactor water chemistry to mitigate corrosion. However, control of water chemistry does not preclude loss of material due to pitting and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of the chemistry control program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.*

   Items Number 3.1.1-13 is applicable to BWRs only and is not used for Seabrook Station.

3. *Loss of material due to pitting and crevice corrosion could occur for stainless steel, nickel alloy, and steel with stainless steel or nickel alloy cladding flanges, nozzles, penetrations, pressure housings, safe ends, and vessel shells, heads and welds exposed to reactor coolant. The existing program relies on control of reactor water chemistry to mitigate corrosion. However, control of water chemistry does not preclude loss of material due to pitting and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of the chemistry control program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.*

   Items Number 3.1.1-14 and 3.1.1-15 are applicable to BWRs only and are not used for Seabrook Station.

4. *Loss of material due to general, pitting, and crevice corrosion could occur in the steel PWR steam generator upper and lower shell and transition cone exposed to secondary feedwater and steam. The existing program relies on control of chemistry to mitigate corrosion and Inservice Inspection (ISI) to detect loss of material. The extent and schedule of the existing steam generator inspections are designed to ensure that flaws cannot attain a depth sufficient to threaten the integrity of the welds. However, according to NRC Information Notice (IN) 90-04, the program may not be sufficient to detect pitting and crevice corrosion, if general and pitting corrosion of the shell is known to exist. The GALL Report recommends augmented inspection to manage this aging effect. Furthermore, the GALL Report clarifies that this issue is limited to Westinghouse Model 44 and 51 Steam Generators where a high stress region exists at the shell to transition cone weld. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Seabrook Station will implement the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to general, pitting and crevice corrosion in steel steam generator components (Feedwater and Main Steam nozzles, lower shell, secondary handholes, secondary manways, shell penetrations, top head, transition cone, and upper shell) exposed to secondary feedwater/steam in the Steam Generator. Since Seabrook Station has Westinghouse Model F Steam Generators, no additional inspections are required. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD and Water Chemistry programs are described in Appendix B.

3.1.2.2.3 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement

1. *Neutron irradiation embrittlement is a TLAA to be evaluated for the period of extended operation for all ferritic materials that have a neutron fluence greater than 10^{17} n/cm2 (E >1 MeV) at the end of the license renewal term. Certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). This TLAA is addressed separately in Section 4.2, "Reactor Vessel Neutron Embrittlement Analysis," of this SRP-LR.*

   At Seabrook Station the evaluation of neutron irradiation embrittlement as a TLAA for the Reactor Vessel is discussed in Section 4.2 of the LRA.

2. *Loss of fracture toughness due to neutron irradiation embrittlement could occur in BWR and PWR reactor vessel beltline shell, nozzle, and welds exposed to reactor coolant and neutron flux. A reactor vessel materials*

surveillance program monitors neutron irradiation embrittlement of the reactor vessel. Reactor vessel surveillance program is plant-specific, depending on matters such as the composition of limiting materials, availability of surveillance capsules, and projected fluence levels. In accordance with 10 CFR Part 50, Appendix H, an applicant is required to submit its proposed withdrawal schedule for approval prior to implementation. Untested capsules placed in storage must be maintained for future insertion. Thus, further staff evaluation is required for license renewal. Specific recommendations for an acceptable AMP are provided in Chapter XI, Section M31 of the GALL Report.

Seabrook Station will implement the Reactor Vessel Surveillance Program, B.2.1.19, to manage loss of fracture toughness due to neutron irradiation embrittlement in the steel with stainless steel cladding in the reactor vessel shell (upper shell, intermediate shell, and lower shell including beltline welds) and the inlet and outlet nozzles exposed to reactor coolant and neutron flex. The Reactor Vessel Surveillance Program provides sufficient material data and dosimetry to monitor irradiation embrittlement at the end of the period of extended operation and to determine the need for operating restrictions on the inlet temperature, neutron spectrum, and neutron flux. The Reactor Vessel Surveillance Program is described in Appendix B.

3.1.2.2.4 Cracking due to Stress Corrosion Cracking (SCC) and Intergranular Stress Corrosion Cracking (IGSCC)

1. *Cracking due to SCC and IGSCC could occur in the stainless steel and nickel alloy BWR top head enclosure vessel flange leak detection lines. The GALL Report recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting cracking due to SCC and IGSCC. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Item Number 3.1.1-19 is applicable to BWRs only and is not used for Seabrook Station.

2. *Cracking due to SCC and IGSCC could occur in stainless steel BWR isolation condenser components exposed to reactor coolant. The existing program relies on control of reactor water chemistry to mitigate SCC and on ASME Section XI ISI. However, the existing program should be augmented to detect cracking due to SCC and IGSCC. The GALL Report recommends an augmented program to include temperature and radioactivity monitoring of the shell-side water, and eddy current testing of tubes to ensure that the component's intended function will be maintained during the period of extended operation. Acceptance criteria are described in Branch Technical Position RLSB-1.*

Item Number 3.1.1-20 is applicable to BWRs only and is not used for Seabrook Station.

3.1.2.2.5 Crack Growth due to Cyclic Loading

Crack growth due to cyclic loading could occur in reactor vessel shell forgings clad with stainless steel using a high-heat-input welding process. Growth of intergranular separations (underclad cracks) in the heat affected zone under austenitic stainless steel cladding is a TLAA to be evaluated for the period of extended operation for all the SA 508-Cl 2 forgings where the cladding was deposited with a high heat input welding process. The methodology for evaluating the underclad flaw should be consistent with the current well-established flaw evaluation procedure and criterion in the ASME Section XI Code. See the SRP-LR, Section 4.7, "Other Plant-specific Time-Limited Aging Analysis," for generic guidance for meeting the requirements of 10 CFR 54.21(c).

Item Number 3.1.1-21 is not applicable to Seabrook Station. The Reactor Vessel Shell is not fabricated of SA 508-Cl 2 forgings clad with stainless steel using a high-heat-input welding process.

3.1.2.2.6 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement and Void Swelling

Loss of fracture toughness due to neutron irradiation embrittlement and void swelling could occur in stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux. The GALL Report recommends no further aging management review if the applicant provides a commitment in the FSAR Supplement 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.

Seabrook Station will implement the PWR Vessel Internals Program, B.2.1.7, to manage loss of fracture toughness due to neutron irradiation embrittlement and void swelling in stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux. The PWR Vessel Internals program is described in Appendix B.

3.1.2.2.7 Cracking due to Stress Corrosion Cracking

1. *Cracking due to SCC could occur in the PWR stainless steel reactor vessel flange leak detection lines and bottom-mounted instrument guide tubes exposed to reactor coolant. The GALL Report recommends further*

evaluation to ensure that these aging effects are adequately managed. The GALL Report recommends that a plant specific AMP be evaluated to ensure that this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB- 1.

Seabrook Station will implement the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, to manage cracking due to stress corrosion cracking in the stainless steel reactor vessel flange leak detection lines exposed to reactor coolant. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program relies on VT-2 examinations to identify and evaluate the degradation of stainless steel reactor vessel flange leak detection lines to ensure that there is no loss of intended function. The ASME Section XI Inservice Inspection program, Subsections IWB, IWC, and IWD program is described in Appendix B.

2. *Cracking due to SCC could occur in Class 1 PWR cast austenitic stainless steel (CASS) reactor coolant system piping, piping components, and piping elements exposed to reactor coolant. The existing program relies on control of water chemistry to mitigate SCC; however SCC could occur for CASS components that do not meet the NUREG-0313 guidelines with regard to ferrite and carbon content. The GALL Report recommends further evaluation of a plant specific program for these components to ensure that this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Seabrook Station will implement the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, which will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage stress corrosion cracking of the Class 1 cast austenitic stainless steel piping components in the Reactor Coolant and Safety Injection Systems. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program relies on VT-2 examinations to identify and evaluate the degradation of the CASS components to ensure that there is no loss of intended function. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and the Water Chemistry Program are discussed in Appendix B.

3.1.2.2.8 Cracking due to Cyclic Loading

1. *Cracking due to cyclic loading could occur in the stainless steel BWR jet pump sensing lines. The GALL Report recommends that a plant specific AMP be evaluated to ensure that this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1 .*

   Item Number 3.1.1-25 is applicable to BWRs only.

2. *Cracking due to cyclic loading could occur in steel and stainless steel BWR isolation condenser components exposed to reactor coolant. The existing program relies on ASME Section XI ISI. However, the existing program should be augmented to detect cracking due to cyclic loading. The GALL Report recommends an augmented program to include temperature and radioactivity monitoring of the shell-side water, and eddy current testing of tubes to ensure that the component's intended function will be maintained during the period of extended operation. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Item Number 3.1.1-26 is applicable to BWRs only and is not used for Seabrook Station.

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 internals screws, bolts, tie rods, and hold-down springs exposed to reactor coolant. The GALL Report recommends no further aging management review if the applicant provides a commitment in the FSAR Supplement 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.

Seabrook Station will implement the PWR Vessel Internals Program, B.2.1.7, to manage the aging effects of loss of preload due to stress relaxation in stainless steel and nickel alloy reactor vessel internal components exposed to reactor coolant. The PWR Vessel Internals program is described in Appendix B.

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. The GALL Report recommends further evaluation of a plant-specific AMP to ensure that this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

Item Number 3.1.1-28 is not applicable to Seabrook Station. Steel steam generator feedwater impingement plates and supports do not exist in the Seabrook Station Steam Generators.

3.1.2.2.11 Cracking due to Flow-Induced Vibration

Cracking due to flow-induced vibration could occur for the BWR stainless steel steam dryers exposed to reactor coolant. The GALL Report recommends further evaluation of a plant-specific AMP to ensure that this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

Item Number 3.1.1-29 is applicable to BWRs only and is not used for Seabrook Station

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. The existing program relies on control of water chemistry to mitigate these effects. The GALL Report recommends no further aging management review if the applicant provides a commitment in the FSAR Supplement 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.

Seabrook Station will implement the PWR Vessel Internals Program, B.2.1.7, and the Water Chemistry Program, B.2.1.2, to manage the aging effects of cracking due to stress corrosion cracking and irradiation-assisted stress corrosion cracking in stainless steel reactor vessel internals components exposed to reactor coolant. The PWR Vessel Internals Program and the Water Chemistry Program are described in Appendix B.

3.1.2.2.13 Cracking due to Primary Water Stress Corrosion Cracking (PWSCC)

Cracking due to PWSCC could occur in PWR components made of nickel alloy and steel with nickel alloy cladding, including reactor coolant pressure boundary components and penetrations inside the RCS such as pressurizer heater sheathes and sleeves, nozzles, and other internal components. With the exception of reactor vessel upper head nozzles and penetrations, the GALL Report recommends ASME Section XI ISI (for Class 1 components) and control of water chemistry. For nickel alloy components, no further aging management review is necessary if the applicant complies with applicable NRC Orders and provides a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff accepted industry guidelines.

Seabrook Station will implement the ASME Section XI Inservice Inspection , Subsections IWB, IWC, and IWD Program, B.2.1.1, the Nickel-Alloy Nozzles and Penetrations Program, B.2.2.3, and the Water Chemistry Program, B.2.1.2, to manage the aging effects of cracking due to primary water stress corrosion cracking in nickel alloy components in the Reactor Coolant System, in the nickel alloy bottom instrument tube and core support pads/core guide lugs in the Reactor Vessel, and the nickel alloy steam generator primary nozzle weld in the Steam Generator. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, the Nickel-Alloy Nozzles and Penetrations Program, and the Water Chemistry Program are described in Appendix B.

3.1.2.2.14 Wall Thinning due to Flow-Accelerated Corrosion

Wall thinning due to flow-accelerated corrosion could occur in steel feedwater inlet rings and supports. The GALL Report references NRC IN 91-19, "Steam Generator Feedwater Distribution Piping Damage," for evidence of flow accelerated corrosion in steam generators and recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting wall thinning due to flow-accelerated corrosion. Acceptance criteria are described in Branch Technical Position RLSB-1.

IN 91-19 was issued to inform licensees of wall thinning due to flow-accelerated corrosion in Combustion Engineering designed steam generator feedwater inlet rings and supports. Seabrook Station is a Westinghouse designed plant with Model F steam generators. Therefore, the issues associated with IN 91-19 are not directly applicable to Seabrook Station. Seabrook Station will implement the Steam Generator Tube Integrity Program, B.2.1.10, to manage wall thinning due to flow-accelerated corrosion in the steel steam generator feedwater inlet ring and supports exposed to secondary Feedwater/steam in the Steam Generators. The Steam Generator Tube Integrity program implements a number of industry guidelines and incorporates a balance of prevention, inspection, evaluation, repair, and leakage monitoring measures to assure that existing environmental conditions are not causing wall thinning that could result in a loss of component intended function. The Steam Generator Tube Integrity program is described in Appendix B.

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 internal components exposed to reactor coolant. The GALL Report recommends no further aging management review if the applicant provides a commitment in the FSAR Supplement 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.*

Seabrook Station will implement the PWR Vessel Internals Program, B.2.1.7, to manage the aging effects of changes in dimensions due to void swelling in stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant. The PWR Vessel Internals program is described in Appendix B.

3.1.2.2.16 Cracking due to Stress Corrosion Cracking and Primary Water Stress Corrosion Cracking

1. *Cracking due to SCC could occur on the primary coolant side of PWR steel steam generator upper and lower heads, tubesheets, and tube-to-tube sheet welds made or clad with stainless steel. Cracking due to PWSCC could occur on the primary coolant side of PWR steel steam generator upper and lower heads, tubesheets, and tube-to-tube sheet welds made or clad with nickel alloy. The GALL Report recommends ASME Section XI ISI and control of water chemistry to manage this aging and recommends no further aging management review for PWSCC of nickel alloy if the applicant complies with applicable NRC Orders and provides a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.*

   Seabrook Station will implement the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, and the Water Chemistry Program, B.2.1.2, to manage cracking due to stress corrosion cracking in the stainless steel canopy seal pressure housing and cracking due to primary water stress corrosion cracking in the nickel alloy control rod drive pressure housing exposed to reactor coolant in the Reactor Vessel. The ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD and Water Chemistry programs are described in Appendix B.

   Item Number 3.1.1-35 is not applicable. Seabrook Station does not have Once-Through Steam Generators and therefore, does not have the components associated with the Once-Through Steam Generators.

2. *Cracking due to SCC could occur on stainless steel pressurizer spray heads. Cracking due to PWSCC could occur on nickel-alloy pressurizer spray heads. The existing program relies on control of water chemistry to mitigate this aging effect. The GALL Report recommends one-time*

inspection to confirm that cracking is not occurring. For nickel alloy welded spray heads, the GALL Report recommends no further aging management review if the applicant complies with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage cracking due to stress corrosion cracking in the stainless steel pressurizer spray head exposed to reactor coolant. The One-Time Inspection and Water Chemistry programs are described in Appendix B.

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 stress corrosion cracking (SCC), primary water stress corrosion cracking (PWSCC), and irradiation assisted stress corrosion cracking (IASCC) could occur in PWR stainless steel and nickel alloy reactor vessel internals components. The existing program relies on control of water chemistry to mitigate these effects. However, the existing program should be augmented to manage these aging effects for reactor vessel internals components. The GALL Report recommends no further aging management review if the applicant provides a commitment in the FSAR Supplement 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.

Seabrook Station will implement the PWR Vessel Internals Program, B.2.1.7, and the Water Chemistry Program, B.2.1.2, to manage cracking due to primary water stress corrosion cracking in the nickel alloy reactor vessel internal components and to manage cracking due to stress corrosion cracking and irradiation assisted stress corrosion cracking in the stainless steel reactor vessel internal components exposed to reactor coolant. The PWR Vessel Internals and the Water Chemistry programs are described in Appendix B.

3.1.2.2.18 Quality Assurance for Aging Management of Nonsafety-Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.1.2.3 Time-Limited Aging Analyses

The time-limited aging analyses identified below are associated with the Reactor Vessel, Internals, and Reactor Coolant System components:

- Section 4.2, Reactor Vessel Neutron Embrittlement
- Section 4.3, Metal Fatigue of Piping and Components
- Section 4.7, Plant-Specific Analyses

3.1.3 CONCLUSION

The Reactor Vessel, Internals, and Reactor Coolant System piping and components subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B. These activities demonstrate that the aging effects associated with the Reactor Vessel, Internals, and Reactor Coolant System will be adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-1	BWR Only				
3.1.1-2	BWR Only				
3.1.1-3	BWR Only				
3.1.1-4	BWR Only				
3.1.1-5	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 is a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-6	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 is a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-7	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 is a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-8	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 is a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-9	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 is a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 is a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-11	BWR Only				
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	Not Applicable. This item is applicable to (Once Through) Steam Generators, which are not used at Seabrook Station. See 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				

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to general, pitting and crevice corrosion in the steel components in the Steam Generators (Feedwater and Main Steam nozzles, lower shell, secondary hand holes, secondary manways, shell penetrations, top head, transition cone, and upper shell) exposed to secondary feedwater/steam. Seabrook Station has Westinghouse Model F Steam Generators. Therefore, additional inspection procedures are not required. See Subsection 3.1.2.2.2.4.
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 Part 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 a TLAA. See 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 Reactor Vessel Surveillance Program, B.2.1.19, will be used to manage loss of fracture toughness due to neutron irradiation embrittlement in the steel with stainless steel cladding reactor vessel shell (Upper shell, Intermediate Shell, and lower shell including beltline welds) and the inlet and outlet nozzles exposed to internal environment of reactor coolant and neutron flux. See Subsection 3.1.2.2.3.2.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Not Applicable. The Seabrook Station Reactor Vessel shell is not fabricated of SA508-Cl 2 forgings clad with stainless steel using a high-heat-input welding process. See Subsection 3.1.2.2.5.
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	Consistent with NUREG-1801. The PWR Vessel Internals Program, B.2.1.7, will be used to manage loss of fracture toughness due to neutron irradiation embrittlement and void swelling in stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux in the Reactor Vessel Internals. See 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	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, will be used to manage cracking due to stress corrosion cracking in the stainless steel reactor vessel closure head flange leak detection lines. See Subsection 3.1.2.2.7.1.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	Components in the Safety Injection system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage stress corrosion cracking of the Class 1 cast austenitic stainless steel piping components in the Reactor Coolant and Safety Injection systems. See 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 PWR Vessel Internals Program, B.2.1.7, will be used to manage loss of preload due to stress relaxation in stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant in the Reactor Vessel Internals. See Subsection 3.1.2.2.9.
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	Not applicable. See Subsection 3.1.2.2.10.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. The PWR Vessel Internals Program, B.2.1.7, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking, irradiation-assisted stress corrosion cracking in stainless steel reactor vessel internals components exposed to reactor coolant in the Reactor Vessel Internals. See Subsection 3.1.2.2.12.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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, Subsections IWB, IWC, and IWD and Water Chemistry and for nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD Program, B.2.1.1, the Nickel-Alloy Nozzles and Penetrations Program, B.2.2.3, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to primary water stress corrosion cracking in nickel alloy components in the Reactor Coolant system, in the nickel alloy bottom instrument tube and core support pads/core guide lugs in the Reactor Vessel, and the nickel alloy Steam Generator primary nozzle weld in the Steam Generator. See Subsection 3.1.2.2.13.
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	Consistent with NUREG-1801 with exceptions. The Steam Generator Tube Integrity Program (with exceptions), B.2.1.10, will be used to manage wall thinning due to flow-accelerated corrosion in the steel Steam Generator feedwater inlet ring and supports exposed to secondary feedwater/steam. See Subsection 3.1.2.2.14.
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 PWR Vessel Internals Program, B.2.1.7, will be used to manage changes in dimensions due to void swelling in stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant in the Reactor Vessel Internals. See Subsection 3.1.2.2.15.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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, Subsections IWB, IWC, and IWD and Water Chemistry and for nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking in the stainless steel canopy seal pressure housing and cracking due to primary water stress corrosion cracking in the nickel alloy control rod drive pressure housing exposed to reactor coolant in the Reactor Vessel. See Subsection 3.1.2.2.16.1.
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, Subsections IWB, IWC, and IWD and Water Chemistry and for nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed	Not Applicable See Subsection 3.1.2.2.16.1.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, unless licensee commitment needs to be confirmed	Consistent with NUREG-1801. The One-Time Inspection Program, B.2.1.20, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking in the stainless steel pressurizer spray head exposed to reactor coolant. See Subsection 3.1.2.2.16.2.
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. The PWR Vessel Internals Program, B.2.1.7, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to primary water stress corrosion cracking in nickel alloy reactor vessel internals components and will also be used to manage cracking due to stress corrosion cracking and irradiation-assisted stress corrosion cracking in stainless steel reactor vessel internal components exposed to reactor coolant in the Reactor Vessel Internals. See Subsection 3.1.2.2.17.
3.1.1-38	BWR Only				
3.1.1-39	BWR Only				

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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				
3.1.1-49	BWR Only				
3.1.1-50	BWR Only				
3.1.1-51	BWR Only				

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in the Chemical and Volume Control, Residual Heat Removal, and Safety Injection systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Bolting Integrity Program, B.2.1.9, will be used to manage loss of preload due to thermal effects, gasket creep, and self-loosening in steel and stainless steel bolting exposed to reactor coolant leakage. Steel bolting is contained in the Reactor Coolant System and Steam Generator systems. Stainless steel bolting is contained in the Chemical and Volume Control System, Reactor Coolant, Reactor Vessel, Residual Heat Removal, and Safety Injection systems. Consistent with NUREG-1801. The Bolting Integrity Program, B.2.1.9, will be used to manage stress corrosion cracking in the steel and stainless steel bolting. Steel bolting is contained in the Steam Generator system. Stainless steel bolting is contained in the Chemical and Volume Control System, Reactor Coolant, Reactor Vessel, Residual Heat Removal, and Safety Injection systems. The Bolting Integrity Program, B.2.1.9, will be used to manage loss of material due to wear in the stainless steel control rod drive flange bolting in the Reactor Vessel.
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 exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage loss of material due to general, pitting, and crevice corrosion in steel piping components in the Reactor Coolant system.
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	Not applicable. There are no copper alloy components exposed to closed cycle cooling water in the Reactor Coolant system, Reactor Vessel, Reactor Vessel Internals, and Steam Generator.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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-81 also provides an alternative for pump casings.	No	Components in the Safety Injection system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, will be used to manage the loss of fracture toughness due to thermal aging embrittlement in cast austenitic stainless steel Class 1 pump casings in the Reactor Coolant system and valve bodies exposed to reactor coolant in the Safety Injection system.
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	Not applicable. There are no copper alloy >15% Zn components exposed to closed cycle cooling water in the Reactor Coolant system, Reactor Vessel, Reactor Vessel Internals and Steam Generator.
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	Not Applicable. The Seabrook Station Reactor Coolant system contains fittings constructed of SA-351 Grade CF8A material in a service condition greater than 482°F. These fittings are in the Reactor Coolant system hot legs between the reactor and the Steam Generators, in the crossover legs between the Steam Generators and the Reactor Coolant pumps and in the cold legs between the Reactor Coolant pumps and the reactor. However, the aging effect in NUREG-1801 for this material and environment combination is not applicable because the molybdenum and ferrite contents for these components are below the industry accepted threshold (<0.5% Mo, <20% ferrite) for loss of fracture toughness due to thermal aging embrittlement.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 Boric Acid Corrosion Program, B.2.1.4, will be used to manage loss of material due to boric acid corrosion on steel reactor coolant pressure boundary external surfaces exposed to air with borated water leakage in the Reactor Coolant system, Reactor Vessel, and Steam Generator.
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 Flow-Accelerated Corrosion Program, B.2.1.8, will be used to manage wall thinning due to flow-accelerated corrosion on steel Steam Generator steam nozzle and feedwater nozzle exposed to secondary feedwater/steam in the Steam Generator.
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	Not applicable. The Seabrook Station utilizes a double-concentric thimble tube design fabricated from wear resistant, seamless Nickel Alloy material (Inconel 600).
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	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, will be used to manage cracking due to cyclic loading in the steel pressurizer integral support exposed to air with metal temperature up to 288^{0}C (550^{0} F) in the Reactor Coolant system.
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	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, will be used to manage cracking due to cyclic loading in the reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings exposed to reactor coolant in the Reactor Coolant system.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, will be used to manage loss of material due to wear in the stainless steel reactor vessel internal upper core plate pins exposed to reactor coolant in the Reactor Vessel Internals.
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, Subsections (IWB, IWC, and IWD) and Water Chemistry	No	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking in the stainless steel and steel with stainless steel cladding in pressurizer components exposed to reactor coolant in the Reactor Coolant system.
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, Subsections (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. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, Nickel-Alloy Penetration Nozzles Welded to the Upper RV Closure Heads of PWRs Program, B.2.1.5, and Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking in nickel-alloy reactor vessel upper head vent pipe and control rod drive penetration nozzles and welds exposed to reactor coolant in the Reactor Vessel.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-66	Steel steam generator secondary manways and handholes (cover only) exposed to air with leaking secondary-side water and/or steam	Loss of material due to erosion	Inservice Inspection, Subsections (IWB, IWC, and IWD) for Class 2 components	No	Not applicable. This item is applicable to (Once Through) Steam Generators which are not used at Seabrook Station.
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	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to cyclic loading in the stainless steel and steel with stainless steel cladding pressurizer components exposed to reactor coolant in the Reactor Coolant system.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in the Chemical and Volume Control, Residual Heat Removal, and Safety Injection systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking in the stainless steel Class 1 piping components in the Chemical and Volume Control, Reactor Coolant, Residual Heat Removal, and Safety Injection systems and the pressurizer diaphragm plate, pressurizer heater sleeves, reactor coolant system cold leg, hot leg, surge line, and spray line components in the Reactor Coolant system exposed to reactor coolant. Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking in the steel with stainless steel cladding in Steam Generator lower head, Steam Generator primary manway, Steam Generator primary nozzle, and the stainless steel Steam Generator primary nozzle safe end, and Steam Generator primary nozzle drain line exposed to reactor coolant in the Steam Generator. The pressurizer relief tank components are not exposed to treated borated water >60°C (>140°F).
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. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking in the stainless steel vessel nozzle safe ends and cracking due to primary water stress corrosion cracking in the nickel alloy nozzle welds exposed to reactor coolant in the Reactor Vessel.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in the Chemical and Volume Control, Residual Heat Removal, and Safety Injection systems have been aligned to this line item due to material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1, Water Chemistry Program, B.2.1.2, and One-Time Inspection of ASME Code Class 1 Small Bore-Piping Program (with exceptions), B.2.1.23, will be used to manage cracking due to stress corrosion cracking, thermal and mechanical loading in the stainless steel Class 1 piping, fittings, and branch connections < NPS 4 exposed to reactor coolant in the Chemical and Volume Control, Reactor Coolant, Residual Heat Removal, and Safety Injection systems.
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 exceptions. The Reactor Head Closure Studs Program (with exceptions), B.2.1.3, will be used to manage cracking due to stress corrosion cracking and loss of material due to wear in the low alloy steel closure head stud assembly exposed to indoor air with reactor coolant leakage in the Reactor Vessel.
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 exceptions. The Steam Generator Tube Integrity Program (with exceptions), B.2.1.10, and the Water Chemistry Program, B.2.1.2, will be used to manage cracking due to OD stress corrosion cracking and inter-granular attack, and loss of material due to fretting and wear in the nickel alloy Steam Generator tubes exposed to secondary feedwater/steam in the Steam Generator.
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 exceptions. The Steam Generator Tube Integrity Program (with exceptions), B.2.1.10, and Water Chemistry Program, B.2.1.2, will be used to manage cracking due to primary water stress corrosion cracking in the nickel alloy Steam Generator tubes and tube plugs exposed to reactor coolant in the Steam Generator.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 exceptions. The Steam Generator Tube Integrity Program (with exceptions), B.2.1.10, and Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking and loss of material due to crevice corrosion and fretting of the nickel alloy anti-vibration bars, and stainless steel tube supports exposed to secondary feedwater/steam in the Steam Generator.
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	Not applicable. This item is applicable to (Once Through) Steam Generators which are not used at Seabrook Station.
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	Consistent with NUREG-1801 with exceptions. The Steam Generator Tube Integrity Program (with exceptions), B.2.1.10, and Water Chemistry Program, B.2.1.2, will be used to manage loss of material due to erosion, general, pitting, and crevice corrosion of carbon steel Steam Generator tube bundle wrapper components exposed to secondary feedwater/steam. Ligament cracking is associated with IV.D1-17 which is a line item for steel support plates which are not applicable to Seabrook Station.
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	Not applicable. Seabrook Station does not use phosphate chemistry in the secondary feedwater/steam.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Not applicable. Seabrook Station does not have steel Steam Generator tube support lattice bars in the Steam Generator.
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	Not applicable. Seabrook Station Steam Generator tube support plates are manufactured from stainless steel.
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	Not applicable. Seabrook Station does not have cast austenitic stainless steel components in the Reactor Vessel Internals.
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 Water Chemistry Program, B.2.1.2, will be used to manage cracking due to primary water stress corrosion cracking in nickel-alloy Steam Generator primary channel head divider plate exposed to reactor coolant in the Steam Generator.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Not applicable. Seabrook Station does not have stainless steel Steam Generator primary channel head divider plate exposed to reactor coolant in the Steam Generator.
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	Components in the Chemical and Volume Control, Residual Heat Removal, and Safety Injection systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage loss of material due to pitting and crevice corrosion in stainless steel components, steel with stainless steel cladding, steel with nickel alloy cladding, and nickel alloy components exposed to reactor coolant. Stainless steel components are contained in the Chemical and Volume Control system, Reactor Coolant system, Reactor Vessel, Reactor Vessel Internals, Residual Heat Removal system, Safety Injection system, and Steam Generator. Steel with stainless steel cladding is contained in the Reactor Coolant system, Reactor Vessel, and Steam Generator Nickel alloy piping components are contained in the Reactor Coolant system, Reactor Vessel, .Reactor Vessel Internals, and Steam Generator. Steel with nickel alloy cladding is contained in the Steam Generator.
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 ASME Inservice Inspection (IWB, IWC, and IWD).	No	Not applicable. This item is applicable to (Once Through) Steam Generators which are not used at Seabrook Station.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. Nickel alloy components exposed to air-indoor uncontrolled (external) are contained in the Reactor Coolant system, Reactor Vessel, Reactor Vessel Internals, and Steam Generator.

Table 3.1.1

Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in Chemical and Volume Control, Residual Heat Removal, and Safety Injection systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. Stainless steel piping components exposed to air-indoor uncontrolled (external) and air with borated water leakage (external) are contained in the Chemical and Volume Control System, Reactor Coolant, Residual Heat Removal, and Safety Injection systems. Stainless steel heat exchanger components are contained in the Reactor Coolant system. Stainless steel pressurizer components, pressurizer diaphragm plate, pressurizer heater sleeves, pressurizer manway cover, and pressurizer safe end welds exposed to air-indoor uncontrolled (external) and air with borated water leakage are contained in the Reactor Coolant system. Stainless steel components, exposed to air-indoor uncontrolled (external) and air with borated water leakage are contained in the Reactor Vessel. Stainless steel piping components with gas environment are contained in the Reactor Coolant system. Stainless steel tanks exposed to air indoor uncontrolled (external) and air with borated water leakage (external) are contained in the Reactor Coolant System. Stainless steel steam generator channel head drain line coupling and primary nozzle safe ends exposed to air indoor uncontrolled (external) and air with borated water leakage (external) are contained in the Steam Generator.
3.1.1-87	Steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Not applicable. Seabrook Station does not have any steel components in concrete in the Reactor Coolant system, Reactor Vessel, Reactor Vessel Internals, and the Steam Generator.

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	V.E-4 (E-41))	3.2.1-23	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	V.E-5 (EP-24)	3.2.1-24	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.E-2 (E-41)	3.2.1-45	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Loss of Preload	Bolting Integrity Program	IV.C2-8 (R-12)	3.1.1-52	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Cracking	Bolting Integrity Program	IV.C2-7 (R-11)	3.1.1-52	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	System Temperature up to 340°C (644°F)	Cumulative Fatigue Damage	TLAA	IV.C2-10 (R-18)	3.1.1-7	A
Bolting (Class 1)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.C2-9 (R-17)	3.1.1-58	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting (Class 1)	Pressure Boundary	Steel	Air With Reactor Coolant Leakage (External)	Loss of Preload	Bolting Integrity Program	IV.C2-8 (R-12)	3.1.1-52	A
Bolting (Class 1)	Pressure Boundary	Steel	System Temperature up to 340°C (644°F)	Cumulative Fatigue Damage	TLAA	IV.C2-10 (R-18)	3.1.1-7	A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.A-28 (E-12)	3.2.1-48	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Heat Exchanger Components (RC-E-126 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Heat Exchanger Components (RC-E-126 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Heat Exchanger Components (RC-E-126 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	C
Heat Exchanger Components (RC-E-126 Shell)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Heat Exchanger Components (RC-E-126 Shell)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.C2-9 (R-17)	3.1.1-58	A
Heat Exchanger Components (RC-E-126 Shell)	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-1 (A-63)	3.3.1-48	B
Heat Exchanger Components (Reactor Coolant Pump Thermal Barrier Heat Exchanger Cooling Coil)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	C

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (Reactor Coolant Pump Thermal Barrier Heat Exchanger Cooling Coil)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D 1-22 (EP-33)	3.2.1-28	B
Heat Exchanger Components (Reactor Coolant Pump Thermal Barrier Heat Exchanger Cooling Coil)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.C2-3 (AP-63)	3.3.1-52	B
Incore Instrument Guide Tube	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Incore Instrument Guide Tube	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Incore Instrument Guide Tube	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program One-Time Inspection of ASME Class 1 Small Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A A B

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Incore Instrument Guide Tube	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program One-Time Inspection of ASME Class 1 Small Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A A B
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Piping and Fittings	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Piping and Fittings	Leakage Boundary (Spatial)	CASS	Gas (Internal)	None	None	IV.E-5 (RP-07)	3.1.1-86	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	IV.E-5 (RP-07)	3.1.1-86	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.A-28 (E-12)	3.2.1-48	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.C2-9 (R-17)	3.1.1-58	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	IV.C2-14 (RP-10)	3.1.1-53	B
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-2 (R-07)	3.1.1-68	A A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program One-Time Inspection of ASME Class 1 Small Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A A B
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Pressurizer Components	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Pressurizer Components	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 1
Pressurizer Components	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program Nickel Alloy Nozzles and Penetrations Program	IV.C2-24 (RP-22)	3.1.1-31	A A A
Pressurizer Components	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer Components	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Pressurizer Components	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Pressurizer Components	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	C

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pressurizer Components	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-18 (R-58)	3.1.1-67	A A
Pressurizer Components	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-19 (R-25)	3.1.1-64	A A
Pressurizer Components	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer Components	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Pressurizer Components	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Components	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-18 (R-58)	3.1.1-67	A A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pressurizer Components	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-19 (R-25)	3.1.1-64	A A
Pressurizer Components	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer Components	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Pressurizer Diaphragm Plate	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Pressurizer Diaphragm Plate	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-18 (R-58)	3.1.1-67	A A
Pressurizer Diaphragm Plate	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-20 (R-217)	3.1.1-68	A A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pressurizer Diaphragm Plate	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer Diaphragm Plate	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Pressurizer Heater Sleeves	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Pressurizer Heater Sleeves	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Pressurizer Heater Sleeves	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-18 (R-58)	3.1.1-67	A A
Pressurizer Heater Sleeves	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-20 (R-217)	3.1.1-68	A A
Pressurizer Heater Sleeves	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer Heater Sleeves	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pressurizer Integral Support	Structural Support	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Integral Support	Structural Support	Steel	Air With metal temperature up to 288°C (550° F) (External)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program	IV.C2-16 (R-19)	3.1.1-61	A
Pressurizer Integral Support	Structural Support	Steel	System Temperature up to 340°C (644°F)	Cumulative Fatigue Damage	TLAA	IV.C2-10 (R-18)	3.1.1-7	A
Pressurizer Manway Cover	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Manway Cover	Pressure Boundary	Steel With Stainless Steel Cladding	Air-Indoor Uncontrolled (Internal)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Pressurizer Nozzle	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Nozzle	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-18 (R-58)	3.1.1-67	A A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pressurizer Nozzle	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-19 (R-25)	3.1.1-64	A A
Pressurizer Nozzle	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer Nozzle	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Pressurizer Nozzle Safe End	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Pressurizer Nozzle Safe End	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Pressurizer Nozzle Safe End	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-18 (R-58)	3.1.1-67	A A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pressurizer Nozzle Safe End	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-19 (R-25)	3.1.1-64	A A
Pressurizer Nozzle Safe End	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer Nozzle Safe End	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Pressurizer Spray Head	Spray	Stainless Steel	Reactor Coolant (Internal/External)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-18 (R-58)	3.1.1-67	A A
Pressurizer Spray Head	Spray	Stainless Steel	Reactor Coolant (Internal/External)	Cracking	Water Chemistry Program One-Time Inspection Program	IV.C2-17 (R-24)	3.1.1-36	A A
Pressurizer Spray Head	Spray	Stainless Steel	Reactor Coolant (Internal/External)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Pump Casing (Class 1)	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Pump Casing (Class 1)	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Pump Casing (Class 1)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-3 (R-05)	3.1.1-24	E, 2
Pump Casing (Class 1)	Pressure Boundary	CASS	Reactor Coolant (Internal) >250^{0}C (>482^{0}F)	Loss of Fracture Toughness	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program	IV.C2-6 (R-08)	3.1.1-55	A
Pump Casing (Class 1)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Pump Casing (Class 1)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program	IV.C2-26 (R-56)	3.1.1-62	A
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-3 (R-05)	3.1.1-24	E, 2
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	CASS	Reactor Coolant (Internal) >250^{0}C (>482^{0}F)	None	None	IV.C2-4 (R-52)	3.1.1-57	I, 3
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program	IV.C2-26 (R-56)	3.1.1-62	A
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-27 (R-30)	3.1.1-68	A A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Reactor Coolant System Piping and Fittings (Hot Leg, Cold Leg, Surge Line and Spray Line)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Rupture Disk	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Rupture Disk	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Rupture Disk	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.G-41 (S-13)	3.4.1-6	A A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Gas (Internal)	None	None	IV.E-5 (RP-07)	3.1.1-86	A
Thermowell	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Thermowell (Class 1)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Thermowell (Class 1)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

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REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program	IV.C2-1 (R-02)	3.1.1-70	A A B
Thermowell (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Thermowell (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.A-28 (E-12)	3.2.1-48	A
Valve Body	Leakage Boundary (Spatial)	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	IV.E-5 (RP-07)	3.1.1-86	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.A-28 (E-12)	3.2.1-48	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.C2-9 (R-17)	3.1.1-58	A
Valve Body	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	IV.C2-14 (RP-10)	3.1.1-53	B
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

Table 3.1.2-1

REACTOR COOLANT SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-5 (R-09)	3.1.1-68	A A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	NUREG-1801 does not include air with borated water leakage for nickel alloy components. Similar to V.F-13 for stainless steel, there are no aging effects for nickel alloy in air with borated water leakage. Additionally, the American Welding Society (AWS) “Welding Handbook,” (Seventh Edition, Volume 4, 1982, Library of Congress) identifies that nickel chromium alloy materials that are alloyed with iron, molybdenum, tungsten, cobalt or copper in various combinations have improved corrosion resistance.

2 NUREG-1801 specifies a plant-specific program for this line item. The ASME Section XI Inservice Inspection Subsections IWB, IWC and IWD Program and Water Chemistry Program are used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3 The Seabrook Station Reactor Coolant system contains statically cast fittings constructed of SA-351 Grade CF8A material in a service condition greater than 482°F. However, the aging effect in NUREG-1801 for this material and environment combination is not applicable because the molybdenum and ferrite contents for these components are below the industry accepted threshold (<0.5% molybdenum and <20% ferrite). Therefore, loss of fracture toughness due to thermal aging embrittlement is not applicable.

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Canopy Seal Pressure Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Canopy Seal Pressure Housing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Canopy Seal Pressure Housing	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.A2-11 (R-76)	3.1.1-34	C C
Canopy Seal Pressure Housing	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Canopy Seal Pressure Housing	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Closure Head Components (Vessel Flange Leak Detection Line)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Closure Head Components (Vessel Flange Leak Detection Line)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Closure Head Components (Vessel Flange Leak Detection Line)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program	IV.A2-5 (R-74)	3.1.1-23	E, 1
Closure Head Components (Vessel Flange Leak Detection Line)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Control Rod Drive Pressure Housing	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Control Rod Drive Pressure Housing	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 2
Control Rod Drive Pressure Housing	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program Nickel-Alloy Nozzles and Penetrations Program	IV.A2-11 (R-76)	3.1.1-34	A A A
Control Rod Drive Pressure Housing	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Control Rod Drive Pressure Housing	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
External Vessel Attachments	Structural Support	Steel	Air-Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	IV.A2-20 (R-70)	3.1.1-7	A
External Vessel Attachments	Structural Support	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel Bottom Instrument Tube	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Reactor Vessel Bottom Instrument Tube	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 2
Reactor Vessel Bottom Instrument Tube	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program Nickel-Alloy Nozzles and Penetrations Program	IV.A2-19 (R-89)	3.1.1-31	A A A
Reactor Vessel Bottom Instrument Tube	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Vessel Bottom Instrument Tube	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel Closure Head	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel Closure Head	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Reactor Vessel Closure Head	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel Closure Head Bolting	Pressure Boundary	Steel	Air With Reactor Coolant Leakage (External)	Loss of Material	Reactor Head Closure Studs Program	IV.A2-3 (R-72)	3.1.1-71	B
Reactor Vessel Closure Head Bolting	Pressure Boundary	Steel	Air With Reactor Coolant Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel Closure Head Bolting	Pressure Boundary	Steel	Air With Reactor Coolant Leakage (External)	Cracking	Reactor Head Closure Studs Program	IV.A2-2 (R-71)	3.1.1-71	B

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Vessel Closure Head Bolting	Pressure Boundary	Steel	Air With Reactor Coolant Leakage (External)	Cumulative Fatigue Damage	TLAA	IV.A2-4 (R-73)	3.1.1-7	A
Reactor Vessel Control Rod Drive Flange Bolting	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Cracking	Bolting Integrity Program	IV.A2-6 (R-78)	3.1.1-52	A
Reactor Vessel Control Rod Drive Flange Bolting	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Cumulative Fatigue Damage	TLAA	IV.C2-10 (R-18)	3.1.1-7	A
Reactor Vessel Control Rod Drive Flange Bolting	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Loss of Material	Bolting Integrity Program	IV.A2-7 (R-79)	3.1.1-52	A
Reactor Vessel Control Rod Drive Flange Bolting	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Loss of Preload	Bolting Integrity Program	IV.A2-8 (R-80)	3.1.1-52	A
Reactor Vessel Control Rod Drive Penetration Nozzle and Welds	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Reactor Vessel Control Rod Drive Penetration Nozzle and Welds	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 2

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Vessel Control Rod Drive Penetration Nozzle and Welds	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program Nickel-Alloy Penetration Nozzles Welded to the Upper RV Closure Heads of PWRs Program	IV.A2-9 (R-75)	3.1.1-65	A A A
Reactor Vessel Control Rod Drive Penetration Nozzle and Welds	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Reactor Vessel Control Rod Drive Penetration Nozzle and Welds	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel Core Support Pads/Guide Lugs	Structural Support	Nickel Alloy	Reactor Coolant (External)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program Nickel-Alloy Nozzles and Penetrations Program	IV.A2-12 (R-88)	3.1.1-31	A A A

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Vessel Core Support Pads/Guide Lugs	Structural Support	Nickel Alloy	Reactor Coolant (External)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Reactor Vessel Core Sup Pads/Guide Lugs	Structural Support	Nickel Alloy	Reactor Coolant (External)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel Flange	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel Flange	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Reactor Vessel Flange	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel Head Vent Pipe	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Reactor Vessel Head Vent Pipe	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 2

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Vessel Head Vent Pipe	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Nickel-Alloy Penetration Nozzles Welded to the Upper RV Closure Heads of PWRs Program Water Chemistry Program	IV.A2-18 (R-90)	3.1.1-65	A A A
Reactor Vessel Head Vent Pipe	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Reactor Vessel Head Vent Pipe	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel Nozzle Safe Ends and Welds	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Reactor Vessel Nozzle Safe Ends and Welds	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Reactor Vessel Nozzle Safe Ends and Welds	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.A2-15 (R-83)	3.1.1-69	A A

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Vessel Nozzle Safe Ends and Welds	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Reactor Vessel Nozzle Safe Ends and Welds	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel Primary Inlet and Outlet Nozzles	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel Primary Inlet and Outlet Nozzles	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	Reactor Vessel Surveillance	IV.A2-17 (R-82)	3.1.1-18	A
Reactor Vessel Primary Inlet and Outlet Nozzles	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Reactor Vessel Primary Inlet and Outlet Nozzles	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel Primary Inlet and Outlet Nozzle Welds	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Reactor Vessel Primary Inlet and Outlet Nozzle Welds	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 2

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Vessel Primary Inlet and Outlet Nozzle Welds	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.A2-15 (R-83)	3.1.1-69	A A
Reactor Vessel Primary Inlet and Outlet Nozzle Welds	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel Primary Inlet and Outlet Nozzle Welds	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Reactor Vessel Shell (Upper shell, Intermediate Shell, and lower shell including beltline welds)	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel Shell (Upper shell, Intermediate Shell, and lower shell including beltline welds)	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A2-21 (R-219)	3.1.1-9	A
Reactor Vessel Shell (Upper Shell, Intermediate Shell, And Lower Shell Including Beltline Welds)	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant and Neutron Flux (Internal)	Loss of Fracture Toughness	TLAA	IV.A2-23 (R-84)	3.1.1-17	A

Table 3.1.2-2

REACTOR VESSEL

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Reactor Vessel Shell (Upper Shell, Intermediate Shell, And Lower Shell Including Beltline Welds)	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant and Neutron Flux (Internal)	Loss of Fracture Toughness	Reactor Vessel Surveillance Program	IV.A2-24 (RP-28)	3.1.1-18	A
Reactor Vessel Shell (Upper Shell, Intermediate Shell, And Lower Shell Including Beltline Welds)	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.A2-14 (RP-28)	3.1.1-83	A

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies a plant-specific program for this line item. The ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

2	NUREG-1801 does not include air with borated water leakage environment for nickel alloy components. Similar to V.F-13 for stainless steel, there are no aging effects for nickel alloy in air with borated water leakage. Additionally, the American Welding Society (AWS) “Welding Handbook,” (Seventh Edition, Volume 4, 1982, Library of Congress) identifies that nickel chromium alloy materials that are alloyed with iron, molybdenum, tungsten, cobalt or copper in various combinations have improved corrosion resistance.

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Baffle and Former Plates	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-1 (R-124)	3.1.1-33	A
Baffle and Former Plates	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-2 (R-123)	3.1.1-30	A A
Baffle and Former Plates	Direct Flow Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-3 (R-127)	3.1.1-22	A
Baffle and Former Plates	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Baffle and Former Plates	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Baffle and Former Bolts	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-4 (R-126)	3.1.1-33	A
Baffle and Former Bolts	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-10 (R-125)	3.1.1-30	A A
Baffle and Former Bolts	Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-6 (R-128)	3.1.1-22	A
Baffle and Former Bolts	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Baffle and Former Bolts	Structural Support	Stainless Steel	Reactor Coolant	Loss of Preload	PWR Vessel Internals	IV.B2-5 (R-129)	3.1.1-27	A
Baffle and Former Bolts	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Bottom Support Forging	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-23 (R-139)	3.1.1-33	A
Bottom Support Forging	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-24 (R-138)	3.1.1-30	A A
Bottom Support Forging	Direct Flow Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-22 (R-141)	3.1.1-22	A
Bottom Support Forging	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Bottom Support Forging	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Clevis Inserts	Structural Support	Nickel Alloy	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-19 (R-131)	3.1.1-33	A
Clevis Inserts	Structural Support	Nickel Alloy	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-20 (R-130)	3.1.1-37	A A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Clevis Inserts	Structural Support	Nickel Alloy	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Clevis Inserts	Structural Support	Nickel Alloy	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Clevis Insert Bolts	Structural Support	Nickel Alloy	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-15 (R-134)	3.1.1-33	A
Clevis Insert Bolts	Structural Support	Nickel Alloy	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-16 (R-133)	3.1.1-37	A A
Clevis Insert Bolts	Structural Support	Nickel Alloy	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-17 (R-135)	3.1.1-22	A
Clevis Insert Bolts	Structural Support	Nickel Alloy	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Clevis Insert Bolts	Structural Support	Nickel Alloy	Reactor Coolant	Loss of Preload	PWR Vessel Internals	IV.B2-14 (R-137)	3.1.1-27	A
Clevis Insert Bolts	Structural Support	Nickel Alloy	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Core Barrel and Core Barrel Flange	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-7 (R-121)	3.1.1-33	A
Core Barrel and Core Barrel Flange	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-8 (R-120)	3.1.1-30	A A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Core Barrel and Core Barrel Flange	Direct Flow Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-9 (R-122)	3.1.1-22	A
Core Barrel and Core Barrel Flange	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Core Barrel and Core Barrel Flange	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Core Barrel Outlet Nozzles	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-7 (R-121)	3.1.1-33	A
Core Barrel Outlet Nozzles	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-8 (R-120)	3.1.1-30	A A
Core Barrel Outlet Nozzles	Direct Flow Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-9 (R-122)	3.1.1-22	A
Core Barrel Outlet Nozzles	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Flux Thimble Guide Tubes	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-11 (R-144)	3.1.1-33	A
Flux Thimble Guide Tubes	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-12 (R-143)	3.1.1-30	A A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flux Thimble Guide Tubes	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Flux Thimble Guide Tubes	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Flux Thimble Tubes	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (Internal)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Flux Thimble Tubes	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (Internal)	None	None	None	None	G, 1
Flux Thimble Tubes	Pressure Boundary	Nickel Alloy	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-12 (R-143)	3.1.1-30	C C
Flux Thimble Tubes	Pressure Boundary	Nickel Alloy	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Flux Thimble Tubes	Pressure Boundary	Nickel Alloy	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Hold Down Spring	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-41 (R-107)	3.1.1-33	A
Hold Down Spring	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-42 (R-106)	3.1.1-30	A A
Hold Down Spring	Structural Support	Stainless Steel	Reactor Coolant	Loss of Preload	PWR Vessel Internals	IV.B2-33 (R-108)	3.1.1-27	A
Hold Down Spring	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Hold Down Spring	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Lower Core Plate	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-19 (R-131)	3.1.1-33	A
Lower Core Plate	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-20 (R-130)	3.1.1-37	A A
Lower Core Plate	Direct Flow Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-18 (R-132)	3.1.1-22	A
Lower Core Plate	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Core Plate	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Lower Core Support Columns	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-23 (R-139)	3.1.1-33	A
Lower Core Support Columns	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-24 (R-138)	3.1.1-30	A A
Lower Core Support Columns	Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-22 (R-141)	3.1.1-22	A
Lower Core Support Columns	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Lower Core Support Columns	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Lower Fuel Alignment Pins	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-15 (R-134)	3.1.1-33	A
Lower Fuel Alignment Pins	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-16 (R-133)	3.1.1-37	A A
Lower Fuel Alignment Pins	Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-17 (R-135)	3.1.1-22	A
Lower Fuel Alignment Pins	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Fuel Alignment Pins	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Lower Radial Support Keys	Structural Support	Nickel Alloy	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-19 (R-131)	3.1.1-33	A
Lower Radial Support Keys	Structural Support	Nickel Alloy	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-20 (R-130)	3.1.1-37	A A
Lower Radial Support Keys	Structural Support	Nickel Alloy	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Radial Support Keys	Structural Support	Nickel Alloy	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Lower Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-15 (R-134)	3.1.1-33	A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Lower Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-16 (R-133)	3.1.1-37	A A
Lower Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-17 (R-135)	3.1.1-22	A
Lower Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Loss of Preload	PWR Vessel Internals	IV.B2-25 (R-136)	3.1.1-27	A
Lower Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Rod Control Cluster Bolts	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-27 (R-119)	3.1.1-33	A
Rod Control Cluster Bolts	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-28 (R-118)	3.1.1-37	A A
Rod Control Cluster Bolts	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Rod Control Cluster Bolts	Structural Support	Stainless Steel	Reactor Coolant	Loss of Preload	PWR Vessel Internals	IV.B2-25 (R-136)	3.1.1-27	C
Rod Control Cluster Bolts	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Rod Control Cluster Pins	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-27 (R-119)	3.1.1-33	A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Rod Control Cluster Pins	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-28 (R-118)	3.1.1-37	A A
Rod Control Cluster Pins	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Rod Control Cluster Pins	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Rod Control Cluster Tubes	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-29 (R-117)	3.1.1-33	A
Rod Control Cluster Tubes	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-30 (R-116)	3.1.1-30	A A
Rod Control Cluster Tubes	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Rod Control Cluster Tubes	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Thermal Shield	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-7 (R-121)	3.1.1-33	A
Thermal Shield	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-8 (R-120)	3.1.1-30	A A
Thermal Shield	Structural Support	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	PWR Vessel Internals	IV.B2-9 (R-122)	3.1.1-22	A
Thermal Shield	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermal Shield	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Upper Core Plate	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-41 (R-107)	3.1.1-33	A
Upper Core Plate	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-42 (R-106)	3.1.1-30	A A
Upper Core Plate	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Upper Core Plate	Direct Flow Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Upper Core Plate Pins	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-39 (R-113)	3.1.1-33	A
Upper Core Plate Pins	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-40 (R-112)	3.1.1-37	A A
Upper Core Plate Pins	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Upper Core Plate Pins	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program	IV.B2-34 (R-115)	3.1.1-63	A
Upper Core Plate Pins	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Upper Fuel Alignment Pins	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-39 (R-113)	3.1.1-33	A
Upper Fuel Alignment Pins	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-40 (R-112)	3.1.1-37	A A
Upper Fuel Alignment Pins	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Upper Fuel Alignment Pins	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Upper Support Column	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-35 (R-110)	3.1.1-33	A
Upper Support Column	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-36 (R-109)	3.1.1-30	A A
Upper Support Column	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Upper Support Column	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Upper Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-39 (R-113)	3.1.1-33	A
Upper Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-40 (R-112)	3.1.1-37	A A
Upper Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-3

REACTOR VESSEL INTERNALS

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Upper Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Loss of Preload	PWR Vessel Internals	IV.B2-38 (R-114)	3.1.1-27	A
Upper Support Column Bolts	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A
Upper Support Plate	Structural Support	Stainless Steel	Reactor Coolant	Changes in Dimensions	PWR Vessel Internals	IV.B2-41 (R-107)	3.1.1-33	A
Upper Support Plate	Structural Support	Stainless Steel	Reactor Coolant	Cracking	PWR Vessel Internals Water Chemistry Program	IV.B2-42 (R-106)	3.1.1-30	A A
Upper Support Plate	Structural Support	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Upper Support Plate	Structural Support	Stainless Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.B2-31 (R-53)	3.1.1-5	A

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 does not include air with borated water leakage environment for nickel alloy components. Similar to V.F-13 for stainless steel, there are no aging effects for nickel alloy in air with borated water leakage. Additionally, the American Welding Society (AWS) “Welding Handbook,” (Seventh Edition, Volume 4, 1982, Library of Congress) identifies that nickel chromium alloy materials that are alloyed with iron, molybdenum, tungsten, cobalt or copper in various combinations have improved corrosion resistance.

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Pressure Boundary Throttle	Nickel Alloy	Secondary Feedwater/Steam (External)	Loss of Material	Water Chemistry Program	VIII.B1-1 (SP-18)	3.4.1-37	A
Orifice	Pressure Boundary Throttle	Nickel Alloy	Secondary Feedwater/Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-1 (SP-18)	3.4.1-37	A
Steam Generator Anti-Vibration Bars	Structural Support	Nickel Alloy	Secondary Feedwater/Steam (External)	Cracking	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-14 (RP-14)	3.1.1-74	B A
Steam Generator Anti-Vibration Bars	Structural Support	Nickel Alloy	Secondary Feedwater/Steam (External)	Loss of Material	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-15 (RP-15)	3.1.1-74	B A
Steam Generator Channel Head Drain Pipe	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC & IWD Program Water Chemistry Program Nickel Alloy Nozzles and Penetrations Program	IV.D1-4 (R-01)	3.1.1-31	A A A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Channel Head Drain Pipe	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Channel Head Drain Pipe	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-8 (R-221)	3.1.1-10	A
Steam Generator Channel Head Drain Pipe Coupling	Pressure Boundary	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Steam Generator Channel Head Drain Pipe Coupling	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Steam Generator Channel Head Drain Pipe Coupling	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC & IWD Program Water Chemistry Program	IV.D1-1 (R-07)	3.1.1-68	A A
Steam Generator Channel Head Drain Pipe Coupling	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Channel Head Drain Pipe Coupling	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-8 (R-221)	3.1.1-10	A
Steam Generator Divider Plate	Pressure Boundary	Nickel Alloy	Reactor Coolant (External)	Cracking/PWSCC	Water Chemistry Program	IV.D1-6 (RP-21)	3.1.1-81	A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Divider Plate	Pressure Boundary	Nickel Alloy	Reactor Coolant (External)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Divider Plate	Pressure Boundary	Nickel Alloy	Reactor Coolant (External)	Cumulative Fatigue Damage	TLAA	IV.D1-8 (R-221)	3.1.1-10	A
Steam Generator Feedwater Inlet Ring	Pressure Boundary	Steel	Secondary Feedwater/Steam (External)	Loss of Material	Water Chemistry Program	VIII.B1-8 (S-07)	3.4.1-37	A
Steam Generator Feedwater Inlet Ring	Pressure Boundary	Steel	Secondary Feedwater/Steam (External)	Wall Thinning	Steam Generator Tube Integrity Program	IV.D1-26 (R-51)	3.1.1-32	E, 1
Steam Generator Feedwater Inlet Ring	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-8 (S-07)	3.4.1-37	A
Steam Generator Feedwater Inlet Ring	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Wall Thinning	Steam Generator Tube Integrity Program	IV.D1-26 (R-51)	3.1.1-32	E, 1

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Feedwater Inlet Ring (J Tube)	Pressure Boundary	Nickel Alloy	Secondary Feedwater/Steam (External)	Loss of Material	Water Chemistry Program	VIII.B1-1 (SP-18)	3.4.1-37	A
Steam Generator Feedwater Inlet Ring (J Tube)	Pressure Boundary	Nickel Alloy	Secondary Feedwater/Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-1 (SP-18)	3.4.1-37	A
Steam Generator Feedwater Inlet Ring Support	Structural Support	Steel	Secondary Feedwater/Steam (External)	Loss of Material	Water Chemistry Program	VIII.B1-8 (S-07)	3.4.1-37	C
Steam Generator Feedwater Inlet Ring Support	Structural Support	Steel	Secondary Feedwater/Steam (External)	Wall Thinning	Steam Generator Tube Integrity Program	IV.D1-26 (R-51)	3.1.1-32	E, 1
Steam Generator Feedwater Nozzle (Thermal Sleeve)	Pressure Boundary	Nickel Alloy	Secondary Feedwater/Steam (External)	Loss of Material	Water Chemistry Program	VIII.B1-1 (SP-18)	3.4.1-37	A
Steam Generator Feedwater Nozzle (Thermal Sleeve)	Pressure Boundary	Nickel Alloy	Secondary Feedwater/Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-1 (SP-18)	3.4.1-37	A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Feedwater Nozzle	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Feedwater Nozzle	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-12 (R-34)	3.1.1-16	C C
Steam Generator Feedwater Nozzle	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Wall Thinning	Flow-Accelerated Corrosion Program	IV.D1-5 (R-37)	3.1.1-59	A
Steam Generator Feedwater Nozzle	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-11 (R-33)	3.1.1-7	A
Steam Generator Lower Heads	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Lower Heads	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-1 (R-07)	3.1.1-68	C C
Steam Generator Lower Heads	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Lower Heads	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-8 (R-221)	3.1.1-10	A
Steam Generator Lower Shell	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Lower Shell	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-12 (R-34)	3.1.1-16	A A
Steam Generator Lower Shell	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-11 (R-33)	3.1.1-7	A
Steam Generator Primary Closure Bolting	Pressure Boundary	Steel	Air With Reactor Coolant Leakage (External)	Cracking	Bolting Integrity Program	IV.D1-2 (R-10)	3.1.1-52	A
Steam Generator Primary Closure Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Primary Closure Bolting	Pressure Boundary	Steel	System Temperature Up To 340°C (644°F) (External)	Loss of Preload	Bolting Integrity Program	IV.D1-10 (R-32)	3.1.1-52	A
Steam Generator Primary Closure Bolting	Pressure Boundary	Steel	System Temperature Up To 340°C (644°F) (External)	Cumulative Fatigue Damage	TLAA	IV.C2-10 (R-18)	3.1.1-7	A
Steam Generator Primary Manway	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Primary Manway	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-1 (R-07)	3.1.1-68	A A
Steam Generator Primary Manway	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Primary Manway	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-8 (R-221)	3.1.1-10	A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Primary Manway Cover	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Primary Manway Insert	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Steam Generator Primary Manway Insert	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-1 (R-07)	3.1.1-68	A A
Steam Generator Primary Manway Insert	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Primary Nozzle	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Primary Nozzle	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-1 (R-07)	3.1.1-68	A A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Primary Nozzle	Pressure Boundary	Steel With Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Primary Nozzle	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-8 (R-221)	3.1.1-10	A
Steam Generator Primary Nozzle Safe End	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Steam Generator Primary Nozzle Safe End	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Steam Generator Primary Nozzle Safe End	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-1 (R-07)	3.1.1-68	A A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Primary Nozzle Safe End	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Primary Nozzle Safe End	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-8 (R-221)	3.1.1-10	A
Steam Generator Primary Nozzle Weld	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	IV.E-1 RP-03	3.1.1-85	A
Steam Generator Primary Nozzle Weld	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 2

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Primary Nozzle Weld	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program Nickel Alloy Nozzles and Penetrations Program	IV.D1-4 (R-01)	3.1.1-31	A A A
Steam Generator Primary Nozzle Weld	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	A
Steam Generator Primary Nozzle Weld	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-8 (R-221)	3.1.1-10	A
Steam Generator Secondary Closure Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.E-2 (E-41)	3.2.1-45	A
Steam Generator Secondary Closure Bolting	Pressure Boundary	Steel	System Temperature Up To 340°C (644°F) (External)	Loss of Preload	Bolting Integrity Program	IV.D1-10 (R-32)	3.1.1-52	A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Secondary Closure Bolting	Pressure Boundary	Steel	System Temperature Up To 340°C (644°F) (External)	Cumulative Fatigue Damage	TLAA	IV.C2-10 (R-18)	3.1.1-7	A
Steam Generator Secondary Handholes	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Secondary Handholes	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-12 (R-34)	3.1.1-16	C C
Steam Generator Secondary Manways	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Secondary Manways	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-12 (R-34)	3.1.1-16	C C
Steam Generator Shell Penetrations	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Shell Penetrations	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-12 (R-34)	3.1.1-16	C C
Steam Generator Shell Penetrations	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-11 (R-33)	3.1.1-7	A
Steam Generator Steam Nozzle	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Steam Nozzle	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-12 (R-34)	3.1.1-16	C C
Steam Generator Steam Nozzle	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Wall Thinning	Flow-Accelerated Corrosion Program	IV.D1-5 (R-37)	3.1.1-59	A
Steam Generator Steam Nozzle	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-11 (R-33)	3.1.1-7	A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Top Head	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Top Head	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-12 (R-34)	3.1.1-16	C C
Steam Generator Top Head	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-11 (R-33)	3.1.1-7	A
Steam Generator Transition Cone	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Transition Cone	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-12 (R-34)	3.1.1-16	A A
Steam Generator Transition Cone	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-11 (R-33)	3.1.1-7	A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Tube Bundle Wrapper	Direct Flow	Steel	Secondary Feedwater/Steam (External)	Loss of Material	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-9 (RP-16)	3.1.1-76	B A
Steam Generator Tube Plugs	Pressure Boundary	Nickel Alloy	Reactor Coolant (External)	Cracking	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-18 (R-40)	3.1.1-73	B A
Steam Generator Tube Plugs	Pressure Boundary	Nickel Alloy	Reactor Coolant (External)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Tube Plugs	Pressure Boundary	Nickel Alloy	Reactor Coolant (External)	Cumulative Fatigue Damage	TLAA	IV.D1-21 (R-46)	3.1.1-6	A
Steam Generator Tube Support Plates	Structural Support	Stainless Steel	Secondary Feedwater/Steam (External)	Cracking	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-14 (RP-14)	3.1.1-74	D C
Steam Generator Tube Support Plates	Structural Support	Stainless Steel	Secondary Feedwater/Steam (External)	Loss of Material	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-15 (RP-15)	3.1.1-74	D C

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Tubes	Heat Transfer Pressure Boundary	Nickel Alloy	Secondary Feedwater/Steam (External)	Cracking	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-22 (R-48)	3.1.1-72	B A
Steam Generator Tubes	Heat Transfer Pressure Boundary	Nickel Alloy	Secondary Feedwater/Steam (External)	Cracking	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-23 (R-47)	3.1.1-72	B A
Steam Generator Tubes	Heat Transfer Pressure Boundary	Nickel Alloy	Secondary Feedwater/Steam (External)	Loss of Material	Water Chemistry Program	VIII.B1-1 (SP-18)	3.4.1-37	C
Steam Generator Tubes	Heat Transfer Pressure Boundary	Nickel Alloy	Secondary Feedwater/Steam (External)	Loss of Material	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-24 (R-49)	3.1.1-72	B A
Steam Generator Tubes	Heat Transfer Pressure Boundary	Nickel Alloy	Secondary Feedwater/Steam (External)	Reduction of Heat Transfer	Steam Generator Tube Integrity Program Water Chemistry Program	None	None	H, 3
Steam Generator Tubes	Heat Transfer Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	Steam Generator Tube Integrity Program Water Chemistry Program	IV.D1-20 (R-44)	3.1.1-73	B A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Tubes	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-21 (R-46)	3.1.1-6	A
Steam Generator Tubes	Heat Transfer Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Tubes	Heat Transfer Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Reduction of Heat Transfer	Water Chemistry Program	None	None	H, 4
Steam Generator Tube Sheet	Pressure Boundary	Steel With Nickel Cladding	Secondary Feedwater/Steam (External)	Loss of Material	Steam Generator Tube Integrity Program Water Chemistry Program	VIII.B1-8 (S-07)	3.4.1-37	C
Steam Generator Tube Sheet	Pressure Boundary	Steel With Nickel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-8 (R-221)	3.1.1-10	A
Steam Generator Tube Sheet	Pressure Boundary	Steel With Nickel Cladding	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.B2-32 (RP-24)	3.1.1-83	C
Steam Generator Upper Shell	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4

STEAM GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Steam Generator Upper Shell	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Loss of Material	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.D1-12 (R-34)	3.1.1-16	A A
Steam Generator Upper Shell	Pressure Boundary	Steel	Secondary Feedwater/Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.D1-11 (R-33)	3.1.1-7	A

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies a plant-specific program for this line item. The Steam Generator Tube Integrity Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

2 NUREG-1801 does not include air with borated water leakage environment for nickel alloy components. Similar to V.F-13 for stainless steel, there are no aging effects for nickel alloy in air with borated water leakage. Additionally, the American Welding Society (AWS) “Welding Handbook,” (Seventh Edition, Volume 4, 1982, Library of Congress) identifies that nickel chromium alloy materials that are alloyed with iron, molybdenum, tungsten, cobalt or copper in various combinations have improved corrosion resistance.

3	The aging effect/mechanism of reduction of heat transfer due to fouling is not in NUREG-1801 for this component, material, and environment. However, it is applicable to this combination and therefore, the Water Chemistry Program and Steam Generator Tube Integrity Program are used to manage the aging effects for this component, material, and environment combination.
4	The aging effect/mechanism of reduction of heat transfer due to fouling is not in NUREG-1801 for this component, material, and environment. However, it is applicable to this combination and therefore, the Water Chemistry Program is used to manage the aging effects for this component, material, and environment combination.

3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES

3.2.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.2, Engineered Safety Features, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- Combustible Gas Control System (2.3.2.1)
- Containment Building Spray System (2.3.2.2)
- Residual Heat Removal System (2.3.2.3)
- Safety Injection System (2.3.2.4)

3.2.2 RESULTS

The following tables summarize the results of the aging management review for Engineered Safety Features.

Table 3.2.2-1	Summary of Aging Management Evaluation – Combustible Gas Control System
Table 3.2.2-2	Summary of Aging Management Evaluation – Containment Building Spray System
Table 3.2.2-3	Summary of Aging Management Evaluation – Residual Heat Removal System
Table 3.2.2-4	Summary of Aging Management Evaluation – Safety Injection System

3.2.2.1 Materials, Environments, Aging Effects Requiring Management and Aging Managements Programs

3.2.2.1.1 Combustible Gas Control System

Materials

The materials of construction for the Combustible Gas Control System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Glass

- Stainless Steel
- Steel

Environments

Components of the Combustible Gas Control System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage

Aging Effects Requiring Management

The following aging effects associated with the Combustible Gas Control System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Combustible Gas Control System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- External Surfaces Monitoring Program (B.2.1.24)

Summary of Aging Management Review Results

Table 3.2.2-1, Summary of Aging Management Evaluation – Combustible Gas Control System, summarizes the results of the aging management review for the Combustible Gas Control System.

3.2.2.1.2 Containment Building Spray System

Materials

The materials of construction for the Containment Building Spray System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Elastomer
- Stainless Steel
- Steel
- Steel with Stainless Steel Cladding

Environments

Components of the Containment Building Spray System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Air with Borated Water Leakage
- Closed Cycle Cooling Water
- Steam
- Treated Borated Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Containment Building Spray System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Pre-Load
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Building Spray System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.2.2-2, Summary of Aging Management Evaluation – Containment Building Spray System summarizes the results of the aging management review for the Containment Building Spray System.

3.2.2.1.3 Residual Heat Removal System

Materials

The materials of construction for the Residual Heat Removal System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Glass
- Stainless Steel
- Steel

Environments

Components of the Residual Heat Removal System are exposed to the following environments:

- Air-Indoor Uncontrolled

- Air with Borated Water Leakage
- Air with Reactor Coolant Leakage
- Closed Cycle Cooling Water
- Closed Cycle Cooling Water > 140°F
- Lubricating Oil
- Reactor Coolant
- Treated Borated Water
- Treated Borated Water > 140°F

Aging Effects Requiring Management

The following aging effects associated with the Residual Heat Removal System components and commodities require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Pre-Load
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Building Spray System components:

- ASME Section XI ISI Subsections IWB, IWC & IWD Program (B.2.1.1)
- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1. 4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Lubricating Oil Analysis Program (B.2.1.26)

- One-Time Inspection Program (B.2.1.20)
- One-Time Inspection of ASME Code Class 1 Small Bore Piping (B.2.1.23)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.2.2-3, Summary of Aging Management Evaluation – Residual Heat Removal System summarizes the results of the aging management review for the Residual Heat Removal System.

3.2.2.1.4 Safety Injection System

Materials

The materials of construction for the Safety Injection System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Copper Alloy
- Copper Alloy >15% Zn
- Glass
- Gray Cast Iron
- Stainless Steel
- Steel
- Steel with Stainless Steel Cladding

Environments

Components of the Safety Injection System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Air with Reactor Coolant Leakage

- Closed Cycle Cooling Water
- Gas
- Lubricating Oil
- Reactor Coolant
- Reactor Coolant >250 °C (>482 °F)
- Treated Borated Water

Aging Effects Requiring Management

The following aging effects associated with the Safety Injection System components and commodities require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Fracture Toughness
- Loss of Material
- Loss of Pre-Load
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Safety Injection System components:

- ASME Section XI ISI Subsections IWB, IWC & IWD Program (B.2.1.1)
- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Lubricating Oil Analysis Program (B.2.1.26)

- One-Time Inspection of ASME Code Class 1 Small Bore-Piping Program (B.2.1.23)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.2.2-4, Summary of Aging Management Evaluation – Safety Injection System summarizes the results of the aging management review for the Safety Injection System.

3.2.2.2 AMR results for Which Further Evaluation is recommended by NUREG-1801

NUREG-1800 indicates that further evaluation is necessary for certain aging effects, particularly those that require plant specific programs. Section 3.0 of NUREG-1800 discusses these aging effects that require further evaluation. The following sections are numbered in accordance with the discussions in Section 3.0 of NUREG-1800 and explain Seabrook Station's approach to these areas requiring further evaluation.

3.2.2.2.1 Cumulative Fatigue Damage

Fatigue is 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). This TLAA is addressed separately in Section 4.3, "Metal Fatigue Analysis" of this SRP-LR.

At Seabrook Station, the evaluation of metal fatigue as a TLAA for the Residual Heat Removal and Safety Injection System is discussed 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 steel pump casings with stainless steel cladding exposed to treated borated water. The GALL Report references NRC Information Notice 94-63, Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks, and recommends further evaluation of a plant-specific AMP to ensure that the aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

Item Number 3.2.1-2 is not applicable to Seabrook Station. The Seabrook Station Chemical and Volume Control System Pumps (Charging Pumps), Containment Building Spray Pumps, Residual Heat Removal Pumps, and

Safety Injection Pumps utilize solid stainless steel casings. Therefore, loss of material due to cladding breach is not applicable to Seabrook Station.

3.2.2.2.3 Loss of Material due to Pitting and Crevice Corrosion

1. *Loss of material due to pitting and crevice corrosion could occur for internal surfaces of stainless steel containment isolation piping, piping components, and piping elements exposed to treated water. The existing AMP relies on monitoring and control of water chemistry to mitigate degradation. However, control of water chemistry does not preclude loss of material due to pitting and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of the chemistry control program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to pitting and crevice corrosion in stainless steel piping components exposed to treated water in the Containment Building Spray and Demineralized Water systems. The Water Chemistry and One-Time Inspection Programs are described in Appendix B.

2. *Loss of material from pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements exposed to soil. The GALL Report recommends further evaluation of a plant-specific AMP to ensure that the aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RSLB-1.*

   Item Number 3.2.1-4 is not applicable to Seabrook Station. The Engineering Safety Features do not contain stainless steel components exposed to soil.

3. *Loss of material from pitting and crevice corrosion could occur for BWR stainless steel and aluminum piping, piping components, and piping elements exposed to treated water. The existing AMP relies on monitoring and control of water chemistry for BWRs to mitigate degradation. However, control of water chemistry does not preclude loss of material due to pitting and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL*

Report recommends further evaluation of programs to verify the effectiveness of the water chemistry control program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.

Item Number 3.2.1-5 is applicable to BWRs only and is not used for Seabrook Station.

4. *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 existing program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation to verify the effectiveness of the lubricating oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to pitting and crevice corrosion in stainless steel piping components exposed to lubricating oil in the Residual Heat Removal and Safety Injection systems. In addition, Microbiologically-Influenced Corrosion will be managed on the stainless steel piping components exposed to lubricating oil in the Residual Heat Removal and Safety Injection systems.

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to pitting and crevice corrosion in copper alloy piping components and copper alloy heat exchanger components exposed to lubricating oil in the Safety Injection system.

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to pitting and crevice corrosion in stainless steel heat exchanger components exposed to lubricating oil in the Safety Injection system. In addition, Microbiologically-Influenced Corrosion will be managed for the stainless steel heat exchanger components exposed to lubricating oil in the Safety Injection system.

The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

5. *Loss of material from pitting and crevice corrosion could occur for of partially encased stainless steel tanks exposed to raw water due to cracking of the perimeter seal from weathering. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated because moisture and water can egress under the tank if the perimeter seal is degraded. Acceptance criteria are described in Branch Technical Position RSLB-1.*

   Item Number 3.2.1-7 is not applicable to Seabrook Station. The Engineering Safety Features do not contain partially encased stainless steel tanks with breached moisture barrier exposed to raw water.

6. *Loss of material from pitting and crevice corrosion could occur for stainless steel piping, piping components, piping elements, and tanks exposed to internal condensation. The GALL Report recommends further evaluation of a plant-specific AMP to ensure that the aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RSLB-1.*

   Item Number 3.2.1-8 is not applicable to Seabrook Station. The Engineering Safety Features systems do not contain stainless steel piping, piping components, piping elements, and tank internal surfaces exposed to condensation (internal).

3.2.2.2.4 Reduction of Heat Transfer due to Fouling

1. *Reduction of heat transfer due to fouling could occur for steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil. The existing AMP relies on monitoring and control of lube oil chemistry to mitigate reduction of heat transfer due to fouling. However, control of lube oil chemistry may not always have been adequate to preclude fouling. Therefore, the effectiveness of lube oil chemistry control should be verified to ensure that fouling is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of lube oil chemistry control. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly*

such that the component's intended function will be maintained during the period of extended operation.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of heat transfer due to fouling in copper alloy heat exchanger tubes exposed to lubricating oil in the Chemical and Volume Control, Diesel Generator, and Safety Injection systems. The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

2. *Reduction of heat transfer due to fouling could occur for stainless steel heat exchanger tubes exposed to treated water. The existing program relies on control of water chemistry to manage reduction of heat transfer due to fouling. However, control of water chemistry may have been inadequate. Therefore, the GALL report recommends that the effectiveness of the chemistry control program should be verified to ensure that reduction of heat transfer due to fouling is not occurring. A one-time inspection is an acceptable method to ensure that reduction of heat transfer is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Item Number 3.2.1-10 is not applicable to Seabrook Station. The Engineering Safety Features do not contain stainless steel heat exchanger tubes exposed to treated water

3.2.2.2.5 Hardening and Loss of Strength due to Elastomer Degradation

Hardening and loss of strength due to elastomer degradation could occur in elastomer seals and components associated with the BWR Standby Gas Treatment System ductwork and filters exposed to air-indoor uncontrolled. The GALL Report recommends further evaluation of a plant specific AMP to ensure that the aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RSLB-1.

Item Number 3.2.1-11 is not applicable to Seabrook Station. This line item is 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 (HPSI) pump miniflow recirculation orifice exposed to treated borated water. The GALL Report recommends a plant-specific AMP be evaluated for erosion of the orifice due to extended use of the centrifugal HPSI pump for normal charging. The GALL Report references Licensee Event Report (LER) 50-275/94-023 for evidence of erosion. Further *evaluation is recommended to ensure that the aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RSLB-1.*

The Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage loss of material due to erosion of the stainless steel high pressure pump mini-flow orifice in the Chemical and Volume Control System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is described in Appendix B.

3.2.2.2.7 Loss of Material due to General Corrosion and Fouling

Loss of material due to general corrosion and fouling can occur for steel drywell and suppression chamber spray system nozzle and flow orifice internal surfaces exposed to air - indoor uncontrolled. This could result in plugging of the spray nozzles and flow orifices. This aging mechanism and effect will apply since the spray nozzles and flow orifices are occasionally wetted, even though the majority of the time this system is on standby. The wetting and drying of these components can accelerate corrosion and fouling. The GALL Report recommends further evaluation of a plant-specific AMP to ensure that the aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RSLB-1.

Item Number 3.2.1-13 is applicable to BWRs only and is not used for Seabrook Station.

3.2.2.2.8 Loss of Material due to General, Pitting, and Crevice Corrosion

1. *Loss of material due to general, pitting and crevice corrosion could occur for BWR steel piping, piping components, and piping elements exposed to treated water. The existing AMP relies on monitoring and control of water chemistry) for BWRs to mitigate degradation. However, control of water chemistry does not preclude loss of material due to general, pitting, and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of the water chemistry control program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.*

   Item Number 3.2.1-14 is applicable to BWRs only and is not used for Seabrook Station.

2. *Loss of material due to general, pitting and crevice corrosion could occur for the internal surfaces of steel containment isolation piping, piping components, and piping elements exposed to treated water. The existing AMP relies on monitoring and control of water chemistry to mitigate degradation. However, control of water chemistry does not preclude loss of material due to general, pitting, and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of the chemistry control program. A onetime inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.*

   Item Number 3.2.1-15 is not applicable to Seabrook Station. The Engineering Safety Features do not contain steel containment isolation piping, piping components, and piping elements internal surfaces exposed to treated water.

3. *Loss of material due to general, pitting and crevice corrosion could occur for steel piping, piping components, and piping elements exposed to lubricating oil. The existing program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation to verify the effectiveness of the lubricating oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion in steel piping components exposed to lubricating oil in the Residual Heat Removal and Safety Injection systems.

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion in steel tanks exposed to lubricating oil in the Safety Injection system.

The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

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 (with or without coating or wrapping) piping, piping components, and piping elements buried in soil. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with NUREG-1800, Rev. 1 3.2-6 September 2005 buried components, ensuring that loss of material is not occurring.

Item Number 3.2.1-17 is not applicable to Seabrook Station. The Engineering Safety Features do not contain steel piping (with or without coating or wrapping), piping components, and piping elements buried in soil.

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 identified below are associated with the Engineered Safety Features components:

- Section 4.3, Metal Fatigue of Piping and Components

3.2.3 CONCLUSION

The Engineered Safety Features systems piping and components subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B. These activities demonstrate that the aging effects associated with the Engineered Safety Features systems will be adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-1	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 is a TLAA. Further evaluation is documented in Subsection 3.2.2.2.1.
3.2.1-2	Steel with stainless steel cladding pump casing exposed to treated borated water	Loss of material due to 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 that plant-specific program addresses cladding breach	Not applicable. The Engineering Safety Features systems do not contain steel with stainless steel cladding pump casing exposed to treated borated water. See Subsection 3.2.2.2.2.
3.2.1-3	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	Components in the Demineralized Water system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to pitting and crevice corrosion of the stainless steel piping components exposed to treated water in the Containment Building Spray and Demినerilized Water systems. See Subsection 3.2.2.2.3.1.
3.2.1-4	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	Not applicable. The Engineering Safety Features systems do not contain stainless steel piping, piping components, and piping elements exposed to soil. See Subsection 3.2.2.2.3.2.
3.2.1-5	BWR Only				

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-6	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	Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to pitting and crevice corrosion in stainless steel piping components exposed to lubricating oil in the Residual Heat Removal and Safety Injection systems. In addition, microbiologically-influenced corrosion will be managed for the stainless steel piping components exposed to lubricating oil in the Residual Heat Removal and Safety Injection systems. Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to pitting and crevice corrosion in stainless steel heat exchanger components exposed to lubricating oil in the Safety Injection system. In addition, microbiologically-influenced corrosion will be managed for the stainless steel heat exchanger components exposed to lubricating oil in the Safety Injection system. Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to pitting and crevice corrosion in copper alloy piping components and copper alloy heat exchanger components exposed to lubricating oil in the Safety Injection system. See Subsection 3.2.2.2.3.4.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-7	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	Not applicable. The Engineering Safety Features systems do not contain partially encased stainless steel tanks with breached moisture barrier exposed to raw water. See Subsection 3.2.2.2.3.5.
3.2.1-8	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	The Engineering Safety Features systems do not contain stainless steel piping, piping components, piping elements, and tank internal surfaces exposed to condensation (internal). See Subsection 3.2.2.2.3.6.
3.2.1-9	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	Components in the Chemical and Volume Control and Diesel Generator systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage reduction of heat transfer due to fouling in copper alloy heat exchanger tubes exposed to lubricating oil in the Chemical and Volume Control, Diesel Generator, and Safety Injection systems. See 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	Not applicable. The Engineering Safety Features systems do not contain stainless steel heat exchanger tubes exposed to treated water. See Subsection 3.2.2.2.4.2.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-11	BWR Only				
3.2.1-12	Stainless steel high pressure safety injection (charging) pump mini flow 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	Components in the Chemical and Volume Control system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to erosion of the stainless steel high pressure pump mini-flow orifice exposed to treated borated water in the Chemical and Volume Control system. The Engineering Safety Features systems do not contain stainless steel high pressure safety injection (charging) pump mini flow orifice exposed to treated borated water. See Subsection 3.2.2.2.6.
3.2.1-13	BWR Only				
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	Not applicable. The Engineering Safety Features systems do not contain steel containment isolation piping, piping components, and piping elements internal surfaces exposed to treated water. See Subsection 3.2.2.2.8.2.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion in steel piping components exposed to lubricating oil in the Residual Heat Removal and Safety Injection systems. Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion in steel tanks exposed to lubricating oil in the Safety Injection system. See 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	Not applicable. The Engineering Safety Features systems do not contain steel piping (with or without coating or wrapping), piping components, and piping elements buried in soil. See Subsection 3.2.2.2.9.
3.2.1-18	BWR Only				
3.2.1-19	BWR Only				
3.2.1-20	BWR Only				

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Not applicable. The Engineering Safety Features systems do not contain high-strength steel closure bolting exposed to air with steam or water leakage.
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	Not applicable. The Engineering Safety Features systems do not contain steel closure bolting exposed to air with steam or water leakage
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	Components in the Reactor Coolant system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Bolting Integrity Program, B.2.1.9, will be used to manage loss of material due to general, pitting, and crevice corrosion of the steel bolting exposed to air-indoor uncontrolled in the Combustible Gas Control, Containment Building Spray, Reactor Coolant, Residual Heat Removal, and Safety Injection systems.
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	Components in the Reactor Coolant system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Bolting Integrity Program, B.2.1.9, will be used to manage loss of preload due to thermal effects, gasket creep, and self-loosening in steel bolting exposed to air-indoor uncontrolled in the Combustible Gas Control, Containment Building Spray, Reactor Coolant, Residual Heat Removal, and Safety Injection systems.
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 exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage cracking due to stress corrosion cracking in stainless steel heat exchanger components exposed to closed cycle cooling water in the Residual Heat Removal system.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage loss of material due to general, pitting, crevice, and galvanic corrosion (Containment Building Spray system only) in steel piping components exposed to closed cycle cooling water in the Containment Building Spray and Residual Heat Removal systems.
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 exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage loss of material due to general, pitting, crevice, and galvanic corrosion in steel exchanger components exposed to closed cycle cooling water in the Containment Building Spray, and Residual Heat Removal systems.
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	Components in the Chemical and Volume Control, Reactor Coolant, and Spent Fuel Pool Cooling systems have been aligned with this line item based on material, environment, and aging mechanism. Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage loss of material due to pitting and crevice corrosion in the stainless steel heat exchanger components exposed to closed cycle cooling water in the Chemical and Volume Control, Containment Building Spray, Reactor Coolant, Residual Heat Removal, Safety Injection, and Spent Fuel Pool Cooling systems.
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	Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage loss of material due to pitting, crevice, and galvanic corrosion of the copper alloy heat exchanger components exposed to closed cycle cooling water in the Safety Injection system.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage reduction of heat transfer due to fouling in stainless steel heat exchanger tubes exposed to closed cycle cooling water in the Containment Building Spray and Residual Heat Removal systems. Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage the reduction of heat transfer due to fouling in copper alloy heat exchanger tubes exposed to closed cycle cooling water in the Safety Injection system.
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	Components in the Fire Protection and Reactor Coolant systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to general corrosion on the external surfaces of steel components exposed to air-indoor uncontrolled (external) in the Combustible Gas Control, Containment Building Spray, Fire Protection, Reactor Coolant, Residual Heat Removal, and Safety Injection systems.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in the Auxiliary Boiler, Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Diesel Generator, Diesel Generator Air Handling, Emergency Feedwater Pump House Air Handling, Fire Protection, Fuel Oil, Fuel Storage Building Air Handling, Instrument Air, Primary Auxiliary Building Air Handling, Primary Component Cooling Water, Service Water, and Service Water Pump House Air Handling systems have been aligned with this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to general corrosion in steel piping components or steel ducting components exposed to air-indoor uncontrolled (internal) in the Auxiliary Boiler, Combustible Gas Control, Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Diesel Generator, Diesel Generator Air Handling, Emergency Feedwater Pump House Air Handling, Fire Protection, Fuel Oil, Fuel Storage Building Air Handling, Instrument Air, Primary Auxiliary Building Air Handling, Primary Component Cooling Water, Service Water, and Service Water Pump House Air Handling systems.
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	Not applicable. The Engineering Safety Features systems do not contain steel encapsulation components exposed to air-indoor uncontrolled (internal)

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Not applicable. The Engineering Safety Features systems do not contain steel piping, piping components, and piping elements exposed to condensation (internal).
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 microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Components in the Fire Protection system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Fire Water System Program, B.2.1.16, will be substituted to manage loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion, and fouling of the steel piping components exposed to raw water in the Fire Protection system. The Engineering Safety Features systems do not contain steel containment isolation piping and components internal surfaces exposed to raw water.
3.2.1-36	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	Not applicable. The Engineering Safety Features systems do not contain steel heat exchanger components exposed to raw water.
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	Not applicable. The Engineering Safety Features systems do not contain stainless steel piping, piping components, and piping elements exposed to raw water.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in the Waste Processing Liquid Drains system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling of the stainless steel containment isolation piping components exposed to raw water in the Waste Processing Liquid Drains system (raw water is radioactive liquid waste drainage). The Engineering Safety Features systems do not contain stainless steel containment isolation piping and components internal surfaces exposed to raw water.
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	Components in the Fire Protection system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Fire Water System Program, B.2.1.16, will be substituted to manage loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion, and fouling of the stainless steel heat exchanger components exposed to raw water in the Fire Protection system. The Engineering Safety Features systems do not contain stainless steel heat exchanger components exposed to raw water.
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	Not applicable. The Engineering Safety Features systems do not contain steel and stainless steel heat exchanger tubes exposed to raw water (serviced by open-cycle cooling water).

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	Components in the Diesel Generator system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Selective Leaching of Materials Program (with exceptions), B.2.1.21, will be used to manage loss of material due to selective leaching in copper alloy >15% Zn heat exchanger components exposed to closed cycle cooling water in the Diesel Generator system. The Engineering Safety Features systems do not contain copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water
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	Not applicable. The Engineering Safety Features systems do not contain gray cast iron piping, piping components, piping elements exposed to closed cycle cooling water.
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	Not applicable. The Engineering Safety Features systems do not contain gray cast iron piping, piping components, piping elements exposed to soil.
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	Not applicable. The Engineering Safety Features systems do not contain gray cast iron motor cooler exposed to treated water.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in the Fire Protection, Reactor Coolant, and Steam Generator systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Boric Acid Corrosion Program, B.2.1.4, will be used to manage loss of material due to boric acid corrosion on the external surfaces of the following steel components exposed to air with borated water leakage. a) Steel bolting is contained in the Combustible Gas Control, Containment Building Spray, Reactor Coolant, Residual Heat Removal, Safety Injection, and Steam Generator systems. b) Steel external surfaces are contained in the Combustible Gas Control, Containment Building Spray, Fire Protection, Residual Heat Removal, and Safety Injection systems. The Boric Acid Corrosion Program, B.2.1.4, will be used to manage the loss of material due to boric acid corrosion on the external surfaces of copper alloy >15% Zn piping components exposed air with borated water leakage in the Safety Injection system.
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	Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage the loss of material due to general, pitting, and crevice corrosion in steel encapsulation components exposed to air with borated water leakage (internal) in the Containment Building Spray system.
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	Not applicable. The Engineering Safety Features systems do not contain cast austenitic stainless steel piping, piping components, and piping elements exposed to treated borated water >250°C (>482°F).

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in the Reactor Coolant system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking in stainless steel piping components exposed to treated borated water >140°F in the Reactor Coolant and Residual Heat Removal systems, and stainless steel heat exchanger components exposed to treated borated water >140°F in the Residual Heat Removal system.
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	Components in the Reactor Coolant system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage loss of material due to pitting and crevice corrosion in stainless steel piping components exposed to treated borated water in the Containment Building Spray, Reactor Coolant, Residual Heat Removal, and Safety Injection systems, and stainless steel heat exchanger components exposed to treated borated water in the Containment Building Spray, Reactor Coolant, and Residual Heat Removal systems, and stainless steel tanks exposed to treated borated water in the Containment Building Spray, Reactor Coolant, and Safety Injection systems.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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. Components in the Control Building Air Handling, Diesel Generator, Fire Protection, Instrument Air, Miscellaneous Equipment, Feedwater, and Main Steam systems have been aligned to this line item based on material, environment, and aging effect. Aluminum piping components exposed to air-indoor uncontrolled (internal/external) are contained in the Fire Protection system. Aluminum piping components exposed to air-indoor uncontrolled (external) are contained in the Diesel Generator, Instrument Air, Miscellaneous Equipment, Feedwater, and Main Steam systems. Aluminum heat exchanger components exposed to air-indoor uncontrolled (external) are contained in the Control Building Air Handling and Instrument Air systems. Aluminum fan housing exposed to air-indoor uncontrolled (internal/external) is contained in the Control Building Air Handling system. The Engineering Safety Features systems do not contain aluminum piping, piping components, and piping elements exposed to air-indoor uncontrolled (internal/external).

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-51	Galvanized steel ducting exposed to air-indoor controlled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. Components in the Control Building Air Handling system have been aligned to this line item based on material, environment, and aging effect. The Control Building Air Handling system contains galvanized steel ducting components and galvanized steel tank exposed to Air-Indoor Uncontrolled (external). Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-1 galvanized steel in an indoor controlled air (external) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation. The Control Building Air Handling system contains galvanized steel ducting components exposed to Air-Indoor Uncontrolled (internal). The Engineering Safety Features systems do not contain galvanized steel ducting exposed to air - indoor controlled (external).

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Consistent with NUREG-1801. Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-6 glass in an indoor, uncontrolled air (external) environment exhibits no aging effect and that the component or structure will therefore, remain capable of performing its intended functions consistent with the CLB for the period of extended operation. Glass components exposed to air-indoor uncontrolled (internal/external) are in the Combustible Gas Control system. Glass components exposed to air-indoor uncontrolled (external), lubricating oil, and treated borated water are in the Residual Heat Removal system. Glass components exposed to lubricating oil are contained in the Safety Injection system.
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. Components in the Auxiliary Boiler, Chemical and Volume Control, Chlorination, Containment Air Handling, Containment Enclosure Air Handling, Control Building Air Handling, Demineralized Water, Dewatering, Diesel Generator, Fire Protection, Fuel Handling, Fuel Storage Building Air Handling, Hot Water Heating, Instrument Air, Miscellaneous Equipment , Plant Floor Drain, Potable Water, Primary Component Cooling Water, Service Water, and Vent Gas systems have been aligned with this line item based on material, environment and aging effect. Consistent with NUREG-1801. Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-12 stainless steel in an indoor, uncontrolled air (external) environment exhibits no aging effect and that the component or structure will therefore, remain capable of performing its intended

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					functions consistent with the CLB for the period of extended operation. Stainless steel piping components exposed to air-indoor uncontrolled (external) are contained in the Combustible Gas Control, Containment Building Spray, Demineralized Water, Residual Heat Removal, Safety Injection, and Vent Gas systems and stainless steel piping components in air-indoor uncontrolled (internal) are contained in the Combustible Gas Control and Containment Building Spray systems. Stainless steel heat exchanger components in air-indoor uncontrolled (external) are contained in the Combustible Gas Control, Containment Building Spray, Residual Heat Removal, and Safety Injection systems and stainless steel heat exchanger components exposed to air-indoor uncontrolled (internal) are contained in the Combustible Gas Control system. Stainless steel hydrogen recombiners in air-indoor uncontrolled (internal/external) are contained in the Combustible Gas Control system. Stainless steel screens exposed to air-indoor uncontrolled (external/internal) are contained in the Containment Building Spray system. Stainless steel tanks in air-indoor uncontrolled (external) are contained in the Combustible Gas Control and Containment Building Spray system and stainless steel tanks in air-indoor uncontrolled (internal) are contained in the Combustible Gas Control system. Copper alloy piping components exposed to air indoor uncontrolled (external) are contained in the Auxiliary Boiler, Chemical and Volume Control, Chlorination, Containment Air Handling, Containment Enclosure Air

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Handling, Control Building Air Handling, Deminerilized Water, Dewatering, Diesel Generator, Fire Protection, Fuel Handling, Fuel Storage Building Air Handling, Hot Water Heating, Instrument Air, Miscellaneous Equipment , Plant Floor Drain, Potable Water, Primary Component Cooling Water, and Safety Injection systems. Copper alloy heat exchanger components exposed to air-indoor uncontrolled (external) are contained in the Chemical and Volume Control System, Control Building Air Handling, and Diesel Generator systems Copper alloy tanks exposed to air indoor uncontrolled (external) are contained in the Instrument Air system. Copper alloy heating coils exposed to air indoor uncontrolled (external) are contained in the Hot Water Heating system. Copper alloy ducting components exposed to air-indoor uncontrolled (external) are contained in the Auxiliary Boiler system. Copper alloy piping components exposed to air-indoor uncontrolled (internal) are contained in the Chemical and Volume Control, Containment Air Handling, Containment Enclosure Air Handling, Control Building Air Handling, Dewatering, Diesel Generator, Fire Protection, Fuel Storage Building Air Handling, and Service Water systems.
3.2.1-54	Steel piping, piping components, and piping elements exposed to air-indoor controlled (external)	None	None	NA - No AEM or AMP	Not applicable. The Engineering Safety Features do not contain steel piping, piping components, and piping elements exposed to air-indoor controlled (external)

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-55	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Not applicable. The Engineering Safety Features do not contain steel and stainless steel piping, piping components, and piping elements in concrete.
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	Components in the Vent Gas system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. Stainless steel piping components exposed to internal Gas environment are contained in the Safety Injection and Vent Gas systems.

Table 3.2.1

Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in the Demineralized Water and Vent Gas systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. Stainless steel piping components exposed to air with borated water leakage are contained in the Combustible Gas Control, Containment Building Spray, Demineralized Water, Residual Heat Removal, Safety Injection, and Vent Gas systems. Stainless steel screens exposed to air with borated water leakage (internal/external) are contained in the Containment Building Spray system. Stainless steel heat exchanger components exposed to air with borated water leakage are contained in the Combustible Gas Control, Containment Building Spray, Residual Heat Removal, and Safety Injection systems. Stainless steel hydrogen recombiner components exposed to air with borated water leakage are contained in the Combustible Gas Control system. Stainless steel tanks exposed to air with borated water leakage are contained in the Combustible Gas Control and Containment Building Spray systems.

Table 3.2.2-1

COMBUSTIBLE GAS CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	V.E-5 (EP-24)	3.2.1-24	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.E-2 (E-41)	3.2.1-45	A
Heat Exchanger Components (Cooling Coil inside1-CGC-CP-173 and 174)	Heat Transfer Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Heat Exchanger Components (Cooling Coil inside1-CGC-CP-173 and 174)	Heat Transfer Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Heat Exchanger Components (Cooling Coil inside1-CGC-CP-173 and 174)	Heat Transfer Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	C, 1
Hydrogen Recombiner	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	C

Table 3.2.2-1

COMBUSTIBLE GAS CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Hydrogen Recombiner	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Hydrogen Recombiner	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	C, 1
Instrumentation Element	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Instrumentation Element	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Instrumentation Element	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 1
Orifice	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-1

COMBUSTIBLE GAS CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 1
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 1
Piping and Fittings	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Piping and Fittings	Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Piping and Fittings	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B

Table 3.2.2-1

COMBUSTIBLE GAS CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping Element	Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	V.F-6 (EP-15)	3.2.1-52	A
Piping Element	Pressure Boundary	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 2
Piping Element	Pressure Boundary	Glass	Air-Indoor Uncontrolled (Internal)	None	None	V.F-6 (EP-15)	3.2.1-52	A, 3
Pump Casing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Pump Casing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Pump Casing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 1
Tank	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Tank	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Tank	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	C, 1

Table 3.2.2-1

COMBUSTIBLE GAS CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Structural Integrity (Attached)	CASS	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve Body	Structural Integrity (Attached)	CASS	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body	Structural Integrity (Attached)	CASS	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 1
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 1

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

2	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.
3	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-6 glass in an indoor, uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore, remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	V.E-5 (EP-24)	3.2.1-24	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Control Program	V.E-2 (E-41)	3.2.1-45	A
Expansion Joint	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Expansion Joint	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Expansion Joint	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F3-7 (A-17)	3.3.1-11	E, 1
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F3-7 (A-17)	3.3.1-11	E, 2
Heat Exchanger Components (1-CBS-E-16A and 16B Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	C

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-CBS-E-16A and 16B Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Heat Exchanger Components (1-CBS-E-16A and 16B Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	C
Heat Exchanger Components (1-CBS-E-16A and 16B Channel Head Cover)	Pressure Boundary	Steel With Stainless Steel Cladding	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Heat Exchanger Components (1-CBS-E-16A and 16B Channel Head Cover)	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.A-4 (E-28)	3.2.1-45	A
Heat Exchanger Components (1-CBS-E-16A and 16B Channel Head Cover)	Pressure Boundary	Steel With Stainless Steel Cladding	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.A-7 (E-19)	3.2.1-28	B
Heat Exchanger Components (1-CBS-E-16A and 16B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.A-1 (E-26)	3.2.1-31	B
Heat Exchanger Components (1-CBS-E-16A and 16B Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.A-4 (E-28)	3.2.1-45	A

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-CBS-E-16A and 16B Shell)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.A-9 (E-17)	3.2.1-27	B
Heat Exchanger Components (1-CBS-E-16A and 16B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.A-7 (E-19)	3.2.1-28	B
Heat Exchanger Components (1-CBS-E-16A and 16B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	V.A-13 (EP-35)	3.2.1-30	B
Heat Exchanger Components (1-CBS-E-16A and 16B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	C
Heat Exchanger Components (1-CBS-E-16A and 16B Tube Sheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.A-7 (E-19)	3.2.1-28	B
Heat Exchanger Components (1-CBS-E-16A and 16B Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	C
Heat Exchanger Components (1-CBS-P-9A and 9B Pump Cooler Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.A-1 (E-26)	3.2.1-31	B
Heat Exchanger Components (1-CBS-P-9A and 9B Pump Cooler Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.A-4 (E-28)	3.2.1-45	A

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-CBS-P-9A and 9B Pump Cooler Shell)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.A-9 (E-17)	3.2.1-27	B
Heat Exchanger Components (1-CBS-P-9A and 9B Pump Cooler Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.A-7 (E-19)	3.2.1-28	B
Heat Exchanger Components (1-CBS-P-9A and 9B Pump Cooler Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	V.A-13 (EP-35)	3.2.1-30	B
Heat Exchanger Components (1-CBS-P-9A and 9B Pump Cooler Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	C
Heater Housing (RWST Tank Heater)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.A-1 (E-26)	3.2.1-31	B
Heater Housing (RWST Tank Heater)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.A-4 (E-28)	3.2.1-45	A
Heater Housing (RWST Tank Heater)	Leakage Boundary (Spatial)	Steel	Steam (Internal)	Loss of Material	One-Time Inspection Program Water Chemistry Program	VIII.C-4 (S-06)	3.4.1-2	C C
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Nozzle	Spray	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Nozzle	Spray	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Nozzle	Spray	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 3
Orifice	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Pressure Boundary Throttle	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	V.C-4 (E-33)	3.2.1-3	C C
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 3
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	V.C-4 (E-33)	3.2.1-3	C C

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.A-1 (E-26)	3.2.1-31	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.A-4 (E-28)	3.2.1-45	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.C-9 (EP-48)	3.2.1-26	B
Piping and Fittings (Encapsulation Vessel Guard Pipe)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping and Fittings (Encapsulation Vessel Guard Pipe)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping and Fittings (Encapsulation Vessel Guard Pipe)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (Internal)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Pump Casing	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	V.C-4 (E-33)	3.2.1-3	C C
Screen	Filter	CASS	Air-Indoor Uncontrolled (Internal/External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Screen	Filter	CASS	Air With Borated Water Leakage (Internal/External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Screen	Filter	Stainless Steel	Air-Indoor Uncontrolled (Internal/External)	None	None	V.F-12 (EP-18)	3.2.1-53	A

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Screen	Filter	Stainless Steel	Air With Borated Water Leakage (Internal/External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Tank	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Tank	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Tank	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Tank	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.G-41 (S-13)	3.4.1-6	A A
Tank (Encapsulation Vessel)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.A-1 (E-26)	3.2.1-31	B
Tank (Encapsulation Vessel)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.A-4 (E-28)	3.2.1-45	A

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank (Encapsulation Vessel)	Pressure Boundary	Steel	Air With Borated Water Leakage (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-3 (EP-43)	3.2.1-46	B
Thermowell	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Thermowell	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Thermowell	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Thermowell	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	V.C-4 (E-33)	3.2.1-3	C C
Valve Body	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve Body	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body	Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	V.C-4 (E-33)	3.2.1-3	C C
Valve Body	Pressure Boundary	CASS	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 3
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	V.F-12 (EP-18)	3.2.1-53	A, 3
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.A-27 (EP-41)	3.2.1-49	A
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection Program Water Chemistry Program	V.C-4 (E-33)	3.2.1-3	C C

Table 3.2.2-2

CONTAINMENT BUILDING SPRAY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.A-1 (E-26)	3.2.1-31	B
Valve Body	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.A-4 (E-28)	3.2.1-45	A
Valve Body	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.C-9 (EP-48)	3.2.1-26	B

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.
2	NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.
3	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	V.E-5 (EP-24)	3.2.1-24	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.E-2 (E-41)	3.2.1-45	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Cracking	Bolting Integrity Program	IV.C2-7 (R-11)	3.1.1-52	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Loss of Preload	Bolting Integrity Program	IV.C2-8 (R-12)	3.1.1-52	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Cumulative Fatigue Damage	TLAA	IV.C2-10	3.1.1-7	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	A
Heat Exchanger Components (1-RH-E-9A and 9B Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Heat Exchanger Components (1-RH-E-9A and 9B Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Heat Exchanger Components (1-RH-E-9A and 9B Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	C
Heat Exchanger Components (1-RH-E-9A and 9B Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	C
Heat Exchanger Components (1-RH-E-9A and 9B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Heat Exchanger Components (1-RH-E-9A and 9B Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Heat Exchanger Components (1-RH-E-9A and 9B Shell)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-6 (E-17)	3.2.1-27	B

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-RH-E-9A and 9B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water >140° F (External)	Cracking	Closed-Cycle Cooling Water System Program	V.D1-23 (EP-44)	3.2.1-25	D
Heat Exchanger Components (1-RH-E-9A and 9B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B
Heat Exchanger Components (1-RH-E-9A and 9B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	V.D1-9 (EP-35)	3.2.1-30	B
Heat Exchanger Components (1-RH-E-9A and 9B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	C
Heat Exchanger Components (1-RH-E-9A and 9B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	C
Heat Exchanger Components (1-RH-E-9A and 9B Tube Sheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water >140° F (External)	Cracking	Closed-Cycle Cooling Water System Program	V.D1-23 (EP-44)	3.2.1-25	D
Heat Exchanger Components (1-RH-E-9A and 9B Tube Sheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B
Heat Exchanger Components (1-RH-E-9A and 9B Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	C

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-RH-E-9A and 9B Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	C
Heat Exchanger Components (1-RH-E-188A and 188B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Heat Exchanger Components (1-RH-E-188A and 188B Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Heat Exchanger Components (1-RH-E-188A and 188B Shell)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-6 (E-17)	3.2.1-27	B
Heat Exchanger Components (1-RH-E-188A and 188B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water >140° F (External)	Cracking	Closed-Cycle Cooling Water System Program	V.D1-23 (EP-44)	3.2.1-25	D
Heat Exchanger Components (1-RH-E-188A and 188B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B
Heat Exchanger Components (1-RH-E-188A and 188B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	V.D1-9 (EP-35)	3.2.1-30	B
Heat Exchanger Components (1-RH-E-188A and 188B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	C

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-RH-E-188A and 188B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	C
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	A
Instrumentation Element	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Instrumentation Element	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Instrumentation Element	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-28 (EP-46)	3.2.1-16	B A

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-24 (EP-51)	3.2.1-6	B, 2 A, 2

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.C-9 (EP-48) (E-17)	3.2.1-26	D
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-2 (R-07)	3.1.1-68	A A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25	3.1.1-8	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program One-Time Inspection of ASME Class 1 Small Bore Piping Program Water Chemistry Program	IV.C2-1 (R-02)	3.1.1-70	A B A

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25	3.1.1-8	A
Piping Element	Leakage Boundary (Spatial) Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	V.F-6 (EP-15	3.2.1-52	A
Piping Element	Leakage Boundary (Spatial) Pressure Boundary	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 1
Piping Element	Pressure Boundary	Glass	Lubricating Oil (Internal)	None	None	V.F-7 (EP-16)	3.2.1-52	A
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Borated Water (Internal)	None	None	V.F-9 (EP-30)	3.2.1-52	A
Pump Casing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Pump Casing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Pump Casing	Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	A
Thermowell	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Thermowell	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Thermowell	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Thermowell	Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	A
Valve Body	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve Body	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body	Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	CASS	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-24 (EP-51)	3.2.1-6	B, 2 A, 2
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140° F (Internal)	Cracking	Water Chemistry Program	V.D1-31 (E-12)	3.2.1-48	A

Table 3.2.2-3

RESIDUAL HEAT REMOVAL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Valve Body	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Valve Body	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.C-9 (EP-48)	3.2.1-26	D
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-5 (R-09)	3.1.1-68	A A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25	3.1.1-8	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.
2	Microbiologically Induced Corrosion (MIC) aging mechanism is in addition to the aging mechanisms listed in NUREG 1801.

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	V.E-5 (EP-24)	3.2.1-24	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.E-2 (E-41)	3.2.1-45	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Cracking	Bolting Integrity Program	IV.C2-7 (R-11)	3.1.1-52	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Cumulative Fatigue Damage	TLAA	IV.C2-10	3.1.1-7	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Loss of Preload	Bolting Integrity Program	IV.C2-8 (R-12)	3.1.1-52	A
Filter Element	Filter	Stainless Steel	Lubricating Oil (Internal/External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-24 (EP-51)	3.2.1-6	B A
Filter Housing	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.E-9 (E-28)	3.2.1-45	A
Filter Housing	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-28 (EP-46)	3.2.1-16	B A
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Channel Head)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Shell)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Shell)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	C

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Shell)	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-24 (EP-51)	3.2.1-6	D C
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-18 (EP-45)	3.2.1-6	D C
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-8 (EP-47)	3.2.1-9	B A
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-2 (EP-13)	3.2.1-29	B
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	V.A-11 (EP-39)	3.2.1-30	B
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Tube Sheet)	Pressure Boundary	Stainless Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-24 (EP-51)	3.2.1-6	D C
Heat Exchanger Components (1-SI-P-6A and 6B Pump Cooler Tube Sheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.E-11 (EP-38)	3.2.1-45	A
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-18 (EP-45)	3.2.1-6	B A
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program One-Time Inspection of ASME Class 1 Small Bore Piping Water Chemistry Program	IV.C2-1 (R-02)	3.1.1-70	A B A
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Orifice (Class 1)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25	3.1.1-8	A

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Piping and Fittings	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Piping and Fittings	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-28 (EP-46)	3.2.1-16	B A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-2 (R-07)	3.1.1-68	A A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25	3.1.1-8	A
Piping and Fittings (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program One-Time Inspection of ASME Class 1 Small Bore Piping Water Chemistry Program	IV.C2-1 (R-02)	3.1.1-70	A B A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25	3.1.1-8	A
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Piping Element	Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	V.F-6 (EP-15	3.2.1.52	A
Piping Element	Pressure Boundary	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 1
Piping Element	Pressure Boundary	Glass	Lubricating Oil (Internal)	None	None	V.F-7 (EP-16)	3.2.1-52	A
Pump Casing	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-18 (EP-45)	3.2.1-6	B A

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-18 (EP-45)	3.2.1-6	B A
Pump Casing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Pump Casing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Pump Casing	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Tank	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Tank	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Tank	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-28 (EP-46)	3.2.1-16	D C
Tank	Pressure Boundary	Steel With Stainless Steel Cladding	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Tank	Pressure Boundary	Steel With Stainless Steel Cladding	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Thermowell	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-24 (EP-51)	3.2.1-6	B A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.E-7 (E-44)	3.2.1-31	B
Valve Body	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.D1-1 (E-28)	3.2.1-45	A
Valve Body	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-28 (EP-46)	3.2.1-16	B A
Valve Body (Class 1)	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Valve Body (Class 1)	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Valve Body (Class 1)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-3 (R-05)	3.1.1-24	E, 2
Valve Body (Class 1)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25	3.1.1-8	A
Valve Body (Class 1)	Pressure Boundary	CASS	Reactor Coolant >250°C (>482°F) (Internal)	Loss of Fracture Toughness	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program	IV.C2-6 (R-08)	3.1.1-55	A

Table 3.2.2-4

SAFETY INJECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body (Class 1)	Pressure Boundary	CASS	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-5 (R-09)	3.1.1-68	A A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25	3.1.1-8	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.

2 NUREG-1801 specifies a plant-specific program for this line item. The ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program and Water Chemistry Program are used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3.3 AGING MANAGEMENT OF AUXILIARY SYSTEMS

3.3.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.3, Auxiliary Systems, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- Auxiliary Boiler (2.3.3.1)
- Boron Recovery System (2.3.3.2)
- Chemical and Volume Control System (2.3.3.3)
- Chlorination System (2.3.3.4)
- Containment Air Handling System (2.3.3.5)
- Containment Air Purge System (2.3.3.6)
- Containment Enclosure Air Handling System (2.3.3.7)
- Containment Online Purge System (2.3.3.8)
- Control Building Air Handling System (2.3.3.9)
- Demineralized Water System (2.3.3.10)
- Dewatering System (2.3.3.11)
- Diesel Generator (2.3.3.12)
- Diesel Generator Air Handling System (2.3.3.13)
- Emergency Feed Water Pump House Air Handling System (2.3.3.14)
- Fire Protection System (2.3.3.15)
- Fuel Handling System (2.3.3.16)
- Fuel Oil System (2.3.3.17)
- Fuel Storage Building Air Handling System (2.3.3.18)
- Hot Water Heating System (2.3.3.19)

- Instrument Air System (2.3.3.20)
- Leak Detection System (2.3.3.21)
- Mechanical Seal Supply System (2.3.3.22)
- Miscellaneous Equipment System (2.3.3.23)
- Nitrogen Gas System (2.3.3.24)
- Oil Collection for Reactor Coolant Pumps System (2.3.3.25)
- Plant Floor Drain System (2.3.3.26)
- Potable Water System (2.3.3.27)
- Primary Auxiliary Building Air Handling System (2.3.3.28)
- Primary Component Cooling Water System (2.3.3.29)
- Radiation Monitoring System (2.3.3.30)
- Reactor Makeup Water System (2.3.3.31)
- Release Recovery System (2.3.3.32)
- Resin Sluicing System (2.3.3.33)
- Roof Drains System (2.3.3.34)
- Sample System (2.3.3.35)
- Screen Wash System (2.3.3.36)
- Service Water System (2.3.3.37)
- Service Water Pump House Air Handling System (2.3.3.38)
- Spent Fuel Pool Cooling System (2.3.3.39)
- Switchyard (2.3.3.40)
- Valve Stem Leak-off System (2.3.3.41)
- Vent Gas System (2.3.3.42)
- Waste Gas System (2.3.3.43)

- Waste Processing Liquid System (2.3.3.44)
- Waste Processing Liquid Drains System (2.3.3.45)

3.3.2 RESULTS

The following tables summarize the results of the aging management review for Auxiliary Systems.

Table 3.3.2-1	Summary of Aging Management Evaluation – Auxiliary Boiler
Table 3.3.2-2	Summary of Aging Management Evaluation – Boron Recovery System
Table 3.3.2-3	Summary of Aging Management Evaluation – Chemical and Volume Control System
Table 3.3.2-4	Summary of Aging Management Evaluation – Chlorination System
Table 3.3.2-5	Summary of Aging Management Evaluation – Containment Air Handling System
Table 3.3.2-6	Summary of Aging Management Evaluation – Containment Air Purge System
Table 3.3.2-7	Summary of Aging Management Evaluation – Containment Enclosure Air Handling System
Table 3.3.2-8	Summary of Aging Management Evaluation – Containment Online Purge System
Table 3.3.2-9	Summary of Aging Management Evaluation – Control Building Air Handling System
Table 3.3.2-10	Summary of Aging Management Evaluation – Demineralized Water System
Table 3.3.2-11	Summary of Aging Management Evaluation – Dewatering System
Table 3.3.2-12	Summary of Aging Management Evaluation – Diesel Generator
Table 3.3.2-13	Summary of Aging Management Evaluation – Diesel Generator Air Handling System

Table 3.3.2-14 Summary of Aging Management Evaluation – Emergency Feed Water Pump House Air Handling System

Table 3.3.2-15 Summary of Aging Management Evaluation – Fire Protection System

Table 3.3.2-16 Summary of Aging Management Evaluation – Fuel Handling System

Table 3.3.2-17 Summary of Aging Management Evaluation – Fuel Oil System

Table 3.3.2-18 Summary of Aging Management Evaluation – Fuel Storage Building Air Handling System

Table 3.3.2-19 Summary of Aging Management Evaluation – Hot Water Heating System

Table 3.3.2-20 Summary of Aging Management Evaluation – Instrument Air System

Table 3.3.2-21 Summary of Aging Management Evaluation – Leak Detection System

Table 3.3.2-22 Summary of Aging Management Evaluation – Mechanical Seal Supply System

Table 3.3.2-23 Summary of Aging Management Evaluation – Miscellaneous Equipment

Table 3.3.2-24 Summary of Aging Management Evaluation – Nitrogen Gas System

Table 3.3.2-25 Summary of Aging Management Evaluation – Oil Collection for Reactor Coolant Pumps System

Table 3.3.2-26 Summary of Aging Management Evaluation – Plant Floor Drain System

Table 3.3.2-27 Summary of Aging Management Evaluation – Potable Water System

Table 3.3.2-28 Summary of Aging Management Evaluation – Primary Auxiliary Building Air Handling System

Table 3.3.2-29 Summary of Aging Management Evaluation – Primary Component Cooling Water System

Table 3.3.2-30 Summary of Aging Management Evaluation – Radiation Monitoring System

Table 3.3.2-31 Summary of Aging Management Evaluation – Reactor Makeup Water System

Table 3.3.2-32 Summary of Aging Management Evaluation – Release Recovery System

Table 3.3.2-33 Summary of Aging Management Evaluation – Resin Sluicing System

Table 3.3.2-34 Summary of Aging Management Evaluation – Roof Drains System

Table 3.3.2-35 Summary of Aging Management Evaluation – Sample System

Table 3.3.2-36 Summary of Aging Management Evaluation – Screen Wash System

Table 3.3.2-37 Summary of Aging Management Evaluation – Service Water System

Table 3.3.2-38 Summary of Aging Management Evaluation – Service Water Pump House Air Handling System

Table 3.3.2-39 Summary of Aging Management Evaluation – Spent Fuel Pool Cooling System

Table 3.3.2-40 Summary of Aging Management Evaluation – Switchyard

Table 3.3.2-41 Summary of Aging Management Evaluation – Valve Stem Leak-off System

Table 3.3.2-42 Summary of Aging Management Evaluation – Vent Gas System

Table 3.3.2-43 Summary of Aging Management Evaluation – Waste Gas System

Table 3.3.2-44 Summary of Aging Management Evaluation – Waste Processing Liquid System

Table 3.3.2-45 Summary of Aging Management Evaluation – Waste Processing Liquid Drains System

3.3.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Managements Programs

3.3.2.1.1 Auxiliary Boiler System

Materials

The materials of construction for the Auxiliary Boiler System components requiring aging management review are:

- Aluminum
- Copper Alloy
- Copper Alloy >15% Zn
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Auxiliary Boiler System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Fuel Oil
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Boiler System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Boiler System components:

- Aboveground Steel Tanks Program (B.2.1.17)
- Bolting Integrity Program (B.2.1.9)
- Buried Piping and Tanks Inspection Program (B.2.1.22)
- External Surfaces Monitoring Program (B.2.1.24)
- Fuel Oil Chemistry Program (B.2.1.18)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- One-Time Inspection Program (B.2.1.20)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-1, Summary of Aging Management Evaluation – Auxiliary Boiler System, summarizes the results of the aging management review for the Auxiliary Boiler System.

3.3.2.1.2 Boron Recovery System

Materials

The materials of construction for the Boron Recovery System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Stainless Steel
- Steel

Environments

Components of the Boron Recovery System are exposed to the following environments:

- Air-Indoor Uncontrolled

- Air with Borated Water Leakage
- Raw Water
- Steam
- Treated Borated Water

Aging Effects Requiring Management

The following aging effects associated with the Boron Recovery System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Boron Recovery System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-2, Summary of Aging Management Evaluation – Boron Recovery System, summarizes the results of the aging management review for the Boron Recovery System.

3.3.2.1.3 Chemical And Volume Control System

Materials

The materials of construction for the Chemical and Volume Control System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Copper Alloy
- Copper Alloy >15% Zn
- Elastomer
- Glass
- Gray Cast Iron
- Nickel Alloy
- Stainless Steel
- Steel

Environments

Components of the Chemical and Volume Control System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Air with Reactor Coolant Leakage
- Closed Cycle Cooling Water
- Gas
- Lubricating Oil
- Reactor Coolant
- Steam
- Treated Borated Water
- Treated Borated Water >140°F
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Chemical and Volume Control System components and commodities require management:

- Cracking
- Cumulative Fatigue Damage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Chemical and Volume Control System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD Program (B.2.1.1)
- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Lubricating Oil Analysis Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.20)
- One-Time Inspection of ASME Code Class 1 Small Bore Piping (B.2.1.23)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-3, Summary of Aging Management Evaluation – Chemical and Volume Control System, summarizes the results of the aging management review for the Chemical and Volume Control System.

3.3.2.1.4 Chlorination System

Materials

The materials of construction for the Chlorination System components requiring aging management review are:

- Copper Alloy
- Fiberglass
- Gray Cast Iron
- Nickel Alloy
- Polymer (PVC and PVDF)
- Stainless Steel
- Steel

Environments

Components of the Chlorination System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Condensation
- Raw Water

Aging Effects Requiring Management

The following aging effects associated with the Chlorination System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Chlorination System components:

- Bolting Integrity Program (B.2.1.9)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-4, Summary of Aging Management Evaluation – Chlorination System, summarizes the results of the aging management review for the Chlorination System.

3.3.2.1.5 Containment Air Handling System

Materials

The materials of construction for the Containment Air Handling System components requiring aging management review are:

- Copper Alloy
- Elastomer
- Galvanized Steel
- Stainless Steel
- Steel

Environments

Components of the Containment Air Handling System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Closed Cycle Cooling Water

- Condensation

Aging Effects Requiring Management

The following aging effects associated with the Containment Air Handling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Air Handling System components:

- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)

Summary of Aging Management Review Results

Table 3.3.2-5, Summary of Aging Management Evaluation – Containment Air Handling System, summarizes the results of the aging management review for the Containment Air Handling System.

3.3.2.1.6 Containment Air Purge System

Materials

The materials of construction for the Containment Air Purge System components requiring aging management review are:

- Elastomer
- Galvanized Steel
- Steel

Environments

Components of the Containment Air Purge System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage

Aging Effects Requiring Management

The following aging effects associated with the Containment Air Purge System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Air Purge System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)

Summary of Aging Management Review Results

Table 3.3.2-6, Summary of Aging Management Evaluation – Containment Air Purge System, summarizes the results of the aging management review for the Containment Air Purge System.

3.3.2.1.7 Containment Enclosure Air Handling System

Materials

The materials of construction for the Containment Enclosure Air Handling System components requiring aging management review are:

- Copper Alloy
- Copper Alloy >15% Zn
- Elastomer
- Galvanized Steel
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Containment Enclosure Air Handling System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Closed Cycle Cooling Water
- Condensation
- Concrete

Aging Effects Requiring Management

The following aging effects associated with the Containment Enclosure Air Handling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Enclosure Air Handling System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-7, Summary of Aging Management Evaluation – Containment Enclosure Air Handling System, summarizes the results of the aging management review for the Containment Enclosure Air Handling System.

3.3.2.1.8 Containment Online Purge System

Materials

The materials of construction for the Containment Online Purge System components requiring aging management review are:

- Elastomer
- Galvanized Steel
- Stainless Steel
- Steel

Environments

Components of the Containment Online Purge System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage

Aging Effects Requiring Management

The following aging effects associated with the Containment Online Purge System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Online Purge System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)

Summary of Aging Management Review Results

Table 3.3.2-8, Summary of Aging Management Evaluation – Containment Online Purge System, summarizes the results of the aging management review for the Containment Online Purge System.

3.3.2.1.9 Control Building Air Handling System

Materials

The materials of construction for the Control Building Air Handling System components requiring aging management review are:

- Aluminum
- Cast Austenitic Stainless Steel/CASS
- Copper Alloy
- Copper Alloy >15% Zn
- Elastomer
- Galvanized Steel
- Glass

- Gray Cast Iron
- Polymer (PVC)
- Stainless Steel
- Steel

Environments

Components of the Control Building Air Handling System are exposed to the following environments:

- Air-Indoor Controlled
- Air-Indoor Uncontrolled
- Air-Outdoor
- Closed Cycle Cooling Water
- Condensation
- Gas
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Control Building Air Handling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Control Building Air Handling System components:

- Bolting Integrity Program (B.2.1.9)

- Buried Piping and Tanks Inspection Program (B.2.1.22)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-9, Summary of Aging Management Evaluation – Control Building Air Handling System, summarizes the results of the aging management review for the Control Building Air Handling System.

3.3.2.1.10 Demineralized Water System

Materials

The materials of construction for the Demineralized Water System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Copper Alloy >15% Zn
- Galvanized Steel
- Stainless Steel
- Steel

Environments

Components of the Demineralized Water System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Concrete
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Demineralized Water System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Demineralized Water System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- One-Time Inspection Program (B.2.1.20)
- Selective Leaching of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-10, Summary of Aging Management Evaluation – Demineralized Water System, summarizes the results of the aging management review for the Demineralized Water System.

3.3.2.1.11 Dewatering System

Materials

The materials of construction for the Dewatering System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Copper Alloy
- Copper Alloy >15% Zn
- Elastomer

- Glass
- Polymer (Polypropylene)
- Polymer (PVC)
- Stainless Steel
- Steel

Environments

Components of the Dewatering System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Raw Water

Aging Effects Requiring Management

The following aging effects associated with the Dewatering System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Dewatering System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-11, Summary of Aging Management Evaluation – Dewatering System, summarizes the results of the aging management review for the Dewatering System.

3.3.2.1.12 Diesel Generator

Materials

The materials of construction for the Diesel Generator System components requiring aging management review are:

- Aluminum
- Copper Alloy
- Copper Alloy >15% Zn
- Elastomer
- Glass
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Diesel Generator System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Air with Borated Water Leakage
- Closed Cycle Cooling Water
- Condensation
- Diesel Exhaust
- Dried Air
- Fuel Oil

- Lubricating Oil
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Diesel Generator System components and commodities require management:

- Cracking
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Diesel Generator System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Buried Piping and Tanks Inspection Program (B.2.1.22)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- Compressed Air Monitoring Program (B.2.1.14)
- External Surfaces Monitoring Program (B.2.1.24)
- Fuel Oil Chemistry Program (B.2.1.18)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Lubricating Oil Analysis Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.20)

- Open-Cycle Cooling Water System Program (B.2.1.11)
- Selective Leaching Of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-12, Summary of Aging Management Evaluation – Diesel Generator System, summarizes the results of the aging management review for the Diesel Generator System.

3.3.2.1.13 Diesel Generator Air Handling System

Materials

The materials of construction for the Diesel Generator Air Handling System components requiring aging management review are:

- Elastomer
- Galvanized Steel
- Steel

Environments

Components of the Diesel Generator Air Handling System are exposed to the following environments:

- Air-Indoor Uncontrolled

Aging Effects Requiring Management

The following aging effects associated with the Diesel Generator Air Handling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Diesel Generator Air Handling System components:

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- External Surfaces Monitoring (B.2.1.24)

Summary of Aging Management Review Results

Table 3.3.2-13, Summary of Aging Management Evaluation – Diesel Generator Air Handling System, summarizes the results of the aging management review for the Diesel Generator Air Handling System.

3.3.2.1.14 Emergency Feed Water Pump House Air Handling System

Materials

The materials of construction for the Emergency Feed Water Pump House Air Handling System components requiring aging management review are:

- Elastomer
- Galvanized Steel
- Steel

Environments

Components of the Emergency Feed Water Pump House Air Handling System are exposed to the following environments:

- Air-Indoor Uncontrolled

Aging Effects Requiring Management

The following aging effects associated with the Emergency Feed Water Pump House Air Handling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Emergency Feed Water Pump House Air Handling System components:

- External Surfaces Monitoring Program (B.2.1.24)

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)

Summary of Aging Management Review Results

Table 3.3.2-14, Summary of Aging Management Evaluation – Emergency Feed Water Pump House Air Handling System, summarizes the results of the aging management review for the Emergency Feed Water Pump House Air Handling System.

3.3.2.1.15 Fire Protection System

Materials

The materials of construction for the Fire Protection System components requiring aging management review are:

- Aluminum
- Copper Alloy
- Copper Alloy >15% Zn
- Elastomer
- Galvanized Steel
- Glass
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Fire Protection System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Air With Borated Water Leakage
- Closed Cycle Cooling Water

- Condensation
- Diesel Exhaust
- Fuel Oil
- Gas
- Lubricating Oil
- Raw Water
- Soil
- Steam

Aging Effects Requiring Management

The following aging effects associated with the Fire Protection System components and commodities require management:

- Cracking
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Fire Protection System components:

- Above Ground Steel Tanks Program (B.2.1.17)
- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Buried Piping and Tanks Inspection Program (B.2.1.22)
- External Surfaces Monitoring Program (B.2.1.24)
- Fire Protection Program (B.2.1.15)

- Fire Water System Program (B.2.1.16)
- Fuel Oil Chemistry Program (B.2.1.18)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Lubricating Oil Analysis Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.20)
- Selective Leaching of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-15, Summary of Aging Management Evaluation – Fire Protection System, summarizes the results of the aging management review for the Fire Protection System.

3.3.2.1.16 Fuel Handling System

Materials

The materials of construction for the Fuel Handling System components requiring aging management review are:

- Copper Alloy >15%
- Elastomer
- Glass
- Stainless Steel
- Steel

Environments

Components of the Fuel Handling System are exposed to the following environments:

- Air with Borated Water Leakage
- Air-Indoor Uncontrolled

- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Fuel Handling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Fuel Handling System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- One-Time Inspection Program (B.2.1.20)
- Selective Leaching of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-16, Summary of Aging Management Evaluation – Fuel Handling System, summarizes the results of the aging management review for the Fuel Handling System.

3.3.2.1.17 Fuel Oil System

Materials

The materials of construction for the Fuel Oil System components requiring aging management review are:

- Copper Alloy

- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Fuel Oil System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Fuel Oil

Aging Effects Requiring Management

The following aging effects associated with the Fuel Oil System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Fuel Oil System components:

- Aboveground Steel Tanks Program (B.2.1.17)
- Bolting Integrity Program (B.2.1.9)
- External Surfaces Monitoring Program (B.2.1.24)
- Fire Protection Program (B.2.1.15)
- Fuel Oil Chemistry Program (B.2.1.18)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- One-Time Inspection Program (B.2.1.20)

Summary of Aging Management Review Results

Table 3.3.2-17, Summary of Aging Management Evaluation – Fuel Oil System, summarizes the results of the aging management review for the Fuel Oil System.

3.3.2.1.18 Fuel Storage Building Air Handling System

Materials

The materials of construction for the Fuel Storage Building Air Handling System components requiring aging management review are:

- Copper Alloy
- Elastomer
- Galvanized Steel
- Stainless Steel
- Steel

Environments

Components of the Fuel Storage Building Air Handling System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Condensation

Aging Effects Requiring Management

The following aging effects associated with the Fuel Storage Building Air Handling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Fuel Storage Building Air Handling System components:

- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)

Summary of Aging Management Review Results

Table 3.3.2-18, Summary of Aging Management Evaluation – Fuel Storage Building Air Handling System, summarizes the results of the aging management review for the Fuel Storage Building Air Handling System.

3.3.2.1.19 Hot Water Heating System

Materials

The materials of construction for the Hot Water System components requiring aging management review are:

- Copper Alloy
- Copper Alloy >15% Zn
- Glass
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Hot Water System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Condensation
- Steam
- Treated Water
- Treated Water >140 °F

Aging Effects Requiring Management

The following aging effects associated with the Hot Water System components and commodities require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Hot Water System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- One-Time Inspection Program (B.2.1.20)
- Selective Leaching Of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-19, Summary of Aging Management Evaluation – Hot Water System, summarizes the results of the aging management review for the Hot Water System.

3.3.2.1.20 Instrument Air System

Materials

The materials of construction for the Instrument Air System components requiring aging management review are:

- Aluminum
- Cast Austenitic Stainless Steel/CASS
- Copper Alloy

- Copper Alloy >15% Zn
- Elastomer
- Gray Cast Iron
- Polymer (CPVC and Fluoropolymer)
- Stainless Steel
- Steel

Environments

Components of the Instrument Air System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Air with Borated Water Leakage
- Condensation
- Dried Air
- Lubricating Oil

Aging Effects Requiring Management

The following aging effects associated with the Instrument Air System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Instrument Air System components:

- Bolting Integrity Program (B.2.1.9)

- Boric Acid Corrosion Program (B.2.1.4)
- Compressed Air Monitoring Program (B.2.1.14)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Lubricating Oil Analysis Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.20)

Summary of Aging Management Review Results

Table 3.3.2-20, Summary of Aging Management Evaluation – Instrument Air System, summarizes the results of the aging management review for the Instrument Air System.

3.3.2.1.21 Leak Detection System

Materials

The materials of construction for the Leak Detection System components requiring aging management review are:

- Stainless Steel

Environments

Components of the Leak Detection System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air With Borated Water Leakage

Aging Effects Requiring Management

The following aging effects associated with the Leak Detection System components and commodities require management:

- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Leak Detection System components:

- Bolting Integrity Program (B.2.1.9)

Summary of Aging Management Review Results

Table 3.3.2-21, Summary of Aging Management Evaluation – Leak Detection System, summarizes the results of the aging management review for the Leak Detection System.

3.3.2.1.22 Mechanical Seal Supply System

Materials

The materials of construction for the Mechanical Seal Supply System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Stainless Steel
- Steel

Environments

Components of the Mechanical Seal Supply System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Closed Cycle Cooling Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Mechanical Seal Supply System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Mechanical Seal Supply System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- One- Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-22, Summary of Aging Management Evaluation – Mechanical Seal Supply System, summarizes the results of the aging management review for the Mechanical Seal Supply System.

3.3.2.1.23 Miscellaneous Equipment

Materials

The materials of construction for the Miscellaneous Equipment System components requiring aging management review are:

- Aluminum
- Copper Alloy >15% Zn
- Elastomer
- Stainless Steel
- Steel

Environments

Components of the Miscellaneous Equipment System are exposed to the following environments:

- Air-Indoor Uncontrolled

- Air with Borated Water Leakage
- Lubricating Oil

Aging Effects Requiring Management

The following aging effects associated with the Miscellaneous Equipment System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Miscellaneous Equipment System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping Ducting Components Program (B.2.1.25)
- Lubricating Oil Analysis Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.20)

Summary of Aging Management Review Results

Table 3.3.2-23, Summary of Aging Management Evaluation – Miscellaneous Equipment System, summarizes the results of the aging management review for the Miscellaneous Equipment System.

3.3.2.1.24 Nitrogen Gas System

Materials

The materials of construction for the Nitrogen Gas System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS

- Stainless Steel
- Steel

Environments

Components of the Nitrogen Gas System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air With Borated Water Leakage
- Gas
- Steam
- Treated Borated Water

Aging Effects Requiring Management

The following aging effects associated with the Nitrogen Gas System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Nitrogen Gas System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- One- Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-24, Summary of Aging Management Evaluation – Nitrogen Gas System, summarizes the results of the aging management review for the Nitrogen Gas System.

3.3.2.1.25 Oil Collection For Reactor Coolant Pumps System

Materials

The materials of construction for the Oil Collection for Reactor Coolant Pumps System components requiring aging management review are:

- Stainless Steel
- Steel

Environments

Components of the Oil Collection for Reactor Coolant Pumps System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Lubricating Oil

Aging Effects Requiring Management

The following aging effects associated with the Oil Collection for Reactor Coolant Pumps System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Oil Collection for Reactor Coolant Pumps System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)

- Lubricating Oil Analysis Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.20)

Summary of Aging Management Review Results

Table 3.3.2-25, Summary of Aging Management Evaluation – Oil Collection for Reactor Coolant Pumps System, summarizes the results of the aging management review for the Oil Collection for Reactor Coolant Pumps System.

3.3.2.1.26 Plant Floor Drain System

Materials

The materials of construction for the Plant Floor Drain System components requiring aging management review are:

- Copper Alloy
- Gray Cast Iron
- Polymer (PVC)
- Stainless Steel
- Steel

Environments

Components of the Plant Floor Drain System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Concrete
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Plant Floor Drain System components and commodities require management:

- Loss of Material

- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Plant Floor Drain System components:

- Bolting Integrity Program (B.2.1.9)
- Buried Piping and Tanks Inspection Program (B.2.1.22)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-26, Summary of Aging Management Evaluation – Plant Floor Drain System, summarizes the results of the aging management review for the Plant Floor Drain System.

3.3.2.1.27 Potable Water System

Materials

The materials of construction for the Potable Water System components requiring aging management review are:

- Copper Alloy
- Copper Alloy >15% Zn
- Stainless Steel
- Steel

Environments

Components of the Potable Water System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Raw Water

Aging Effects Requiring Management

The following aging effects associated with the Potable Water System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Potable Water System components:

- Bolting Integrity Program (B.2.1.9)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-27, Summary of Aging Management Evaluation – Potable Water System, summarizes the results of the aging management review for the Potable Water System.

3.3.2.1.28 Primary Auxiliary Building Air Handling System

Materials

The materials of construction for the Primary Auxiliary Building Air Handling System components requiring aging management review are:

- Elastomer
- Galvanized Steel
- Gray Cast Iron
- Steel

Environments

Components of the Primary Auxiliary Building Air Handling System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Closed Cycle Cooling Water

Aging Effects Requiring Management

The following aging effects associated with the Primary Auxiliary Building Air Handling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Primary Auxiliary Building Air Handling System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-28, Summary of Aging Management Evaluation – Primary Auxiliary Building Air Handling System, summarizes the results of the aging management review for the Primary Auxiliary Building Air Handling System.

3.3.2.1.29 Primary Component Cooling Water System

Materials

The materials of construction for the Primary Component Cooling Water System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Copper Alloy
- Copper Alloy >15% Zn
- Glass
- Gray Cast Iron
- Nickel Alloy
- Stainless Steel
- Steel
- Steel with Titanium Cladding
- Titanium

Environments

Components of the Primary Component Cooling Water System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Closed Cycle Cooling Water
- Condensation
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Primary Component Cooling Water System components and commodities require management:

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Primary Component Cooling Water System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- One-Time Inspection Program (B.2.1.20)
- Open-Cycle Cooling Water System Program (B.2.1.11)
- Selective Leaching of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-29, Summary of Aging Management Evaluation – Primary Component Cooling Water System, summarizes the results of the aging management review for the Primary Component Cooling Water System.

3.3.2.1.30 Radiation Monitoring System

Materials

The materials of construction for the Radiation Monitoring System components requiring aging management review are:

- Glass
- Stainless Steel
- Steel

Environments

Components of the Radiation Monitoring System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Closed Cycle Cooling Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Radiation Monitoring System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Radiation Monitoring System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-30, Summary of Aging Management Evaluation – Radiation Monitoring System, summarizes the results of the aging management review for the Radiation Monitoring System.

3.3.2.1.31 Reactor Makeup Water System

Materials

The materials of construction for the Reactor Makeup Water System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Glass
- Stainless Steel
- Steel

Environments

Components of the Reactor Makeup Water System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Treated Borated Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Reactor Makeup Water System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Reactor Makeup Water System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-31, Summary of Aging Management Evaluation – Reactor Makeup Water System, summarizes the results of the aging management review for the Reactor Makeup Water System.

3.3.2.1.32 Release Recovery System

Materials

The materials of construction for the Release Recovery System components requiring aging management review are:

- Stainless Steel
- Steel

Environments

Components of the Release Recovery System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated water leakage
- Treated Borated Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Release Recovery System components and commodities require management:

- Loss of Material

- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Release Recovery System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-32, Summary of Aging Management Evaluation – Release Recovery System, summarizes the results of the aging management review for the Release Recovery System.

3.3.2.1.33 Resin Sluicing System

Materials

The materials of construction for the Resin Sluicing System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Stainless Steel

Environments

Components of the Resin Sluicing System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Treated Borated Water

Aging Effects Requiring Management

The following aging effects associated with the Resin Sluicing System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Resin Sluicing System components:

- Bolting Integrity Program (B.2.1.9)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-33, Summary of Aging Management Evaluation – Resin Sluicing System, summarizes the results of the aging management review for the Resin Sluicing System.

3.3.2.1.34 Roof Drains System

Materials

The materials of construction for the Roof Drains System components requiring aging management review are:

- Gray Cast Iron
- Steel

Environments

Components of the Roof Drains System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Raw Water

Aging Effects Requiring Management

The following aging effects associated with the Roof Drains System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Roof Drains System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-34, Summary of Aging Management Evaluation – Roof Drains System, summarizes the results of the aging management review for the Roof Drains System.

3.3.2.1.35 Sample System

Materials

The materials of construction for the Sample System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Glass
- Polymer (Plastic, Polycarbonate, Polyolefin)
- Stainless Steel
- Steel

Environments

Components of the Sample System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Closed Cycle Cooling Water
- Treated Borated Water
- Treated Borated Water >140 °F
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Sample System components and commodities require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Sample System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-35, Summary of Aging Management Evaluation – Sample System, summarizes the results of the aging management review for the Sample System.

3.3.2.1.36 Screen Wash System

Materials

The materials of construction for the Screen Wash System components requiring aging management review are:

- Copper Alloy
- Copper Alloy >15% Zn
- Fiberglass
- Gray Cast Iron
- Nickel Alloy
- Stainless Steel
- Steel

Environments

Components of the Screen Wash System are exposed to the following environments:

- Condensation
- Raw Water

Aging Effects Requiring Management

The following aging effects associated with the Screen Wash System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Screen Wash System components:

- Bolting Integrity Program (B.2.1.9)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-36, Summary of Aging Management Evaluation – Screen Wash System, summarizes the results of the aging management review for the Screen Wash System.

3.3.2.1.37 Service Water System

Materials

The materials of construction for the Service Water System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Copper Alloy
- Copper Alloy >15% Zn
- Elastomer
- Galvanized Steel
- Glass
- Nickel Alloy
- Polymer (PVC)
- Stainless Steel
- Steel

Environments

Components of the Service Water System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Air with Borated Water Leakage
- Condensation
- Lubricating Oil
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Service Water System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Service Water System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Buried Piping and Tanks Inspection Program (B.2.1.22)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Lubricating Oil Analysis Program (B.2.1.26)

- One-Time Inspection Program (B.2.1.20)
- Open-Cycle Cooling Water System Program (B.2.1.11)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.3.2-37, Summary of Aging Management Evaluation – Service Water System, summarizes the results of the aging management review for the Service Water System.

3.3.2.1.38 Service Water Pump House Air Handling System

Materials

The materials of construction for the Service Water Pump House Air Handling System components requiring aging management review are:

- Elastomer
- Galvanized Steel
- Steel

Environments

Components of the Service Water Pump House Air Handling System are exposed to the following environments:

- Air-Indoor Uncontrolled

Aging Effects Requiring Management

The following aging effects associated with the Service Water Pump House Air Handling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Service Water Pump House Air Handling System components:

- External Surfaces Monitoring Program (B.2.1.24)

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)

Summary of Aging Management Review Results

Table 3.3.2-38, Summary of Aging Management Evaluation – Service Water Pump House Air Handling System, summarizes the results of the aging management review for the Service Water Pump House Air Handling System.

3.3.2.1.39 Spent Fuel Pool Cooling System

Materials

The materials of construction for the Spent Fuel Pool Cooling System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Elastomer
- Glass
- Stainless Steel
- Steel

Environments

Components of the Spent Fuel Pool Cooling System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water leakage
- Closed Cycle Cooling Water
- Treated Borated Water

Aging Effects Requiring Management

The following aging effects associated with the Spent Fuel Pool Cooling System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material

- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Spent Fuel Pool Cooling System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-39, Summary of Aging Management Evaluation – Spent Fuel Pool Cooling System, summarizes the results of the aging management review for the Spent Fuel Pool Cooling System.

3.3.2.1.40 Switchyard

Materials

The materials of construction for the Switchyard components requiring aging management review are:

- Aluminum
- Copper Alloy
- Copper Alloy >15%
- Nickel Alloy
- Stainless Steel
- Steel

Environments

Components of the Switchyard are exposed to the following environments:

- Air-Outdoor
- Gas
- Lubricating Oil

Aging Effects Requiring Management

The following aging effects associated with the Switchyard components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Switchyard components:

- Bolting Integrity Program (B.2.1.9)
- External Surfaces Monitoring Program (B.2.1.24)
- Lubricating Oil Analysis Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.20)

Summary of Aging Management Review Results

Table 3.3.2-40, Summary of Aging Management Evaluation – Switchyard, summarizes the results of the aging management review for the Switchyard.

3.3.2.1.41 Valve Stem Leak-Off System

Materials

The materials of construction for the Valve Stem Leak-off System components requiring aging management review are:

- Stainless Steel

Environments

Components of the Valve Stem Leak-off System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Treated Borated Water
- Treated Borated Water >140°F

Aging Effects Requiring Management

The following aging effects associated with the Valve Stem Leak-off System components and commodities require management:

- Cracking
- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Valve Stem Leak-off System components:

- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-41, Summary of Aging Management Evaluation – Valve Stem Leak-off System, summarizes the results of the aging management review for the Valve Stem Leak-off System.

3.3.2.1.42 Vent Gas System

Materials

The materials of construction for the Vent Gas System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Stainless Steel

Environments

Components of the Vent Gas System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Condensation
- Gas

Aging Effects Requiring Management

The following aging effects associated with the Vent Gas System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Vent Gas System components:

- Bolting Integrity Program (B.2.1.9)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)

Summary of Aging Management Review Results

Table 3.3.2-42, Summary of Aging Management Evaluation – Vent Gas System, summarizes the results of the aging management review for the Vent Gas System.

3.3.2.1.43 Waste Gas System

Materials

The materials of construction for the Waste Gas System components requiring aging management review are:

- Stainless Steel

- Steel

Environments

Components of the Waste Gas System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Gas
- Treated Borated Water

Aging Effects Requiring Management

The following aging effects associated with the Waste Gas System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Waste Gas System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-43, Summary of Aging Management Evaluation – Waste Gas System, summarizes the results of the aging management review for the Waste Gas System.

3.3.2.1.44 Waste Processing Liquid System

Materials

The materials of construction for the Waste Processing Liquid System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Copper Alloy >15% Zn
- Stainless Steel
- Steel

Environments

Components of the Waste Processing Liquid System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Condensation
- Raw Water
- Steam

Aging Effects Requiring Management

The following aging effects associated with the Waste Processing Liquid System components and commodities require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Waste Processing Liquid System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)

- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- One-Time Inspection Program (B.2.1.20)
- Selective Leaching of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-44, Summary of Aging Management Evaluation – Waste Processing Liquid System, summarizes the results of the aging management review for the Waste Processing Liquid System.

3.3.2.1.45 Waste Processing Liquid Drains System

Materials

The materials of construction for the Waste Processing Liquid Drains System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Waste Processing Liquid Drains System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Closed Cycle Cooling Water
- Concrete
- Raw Water

- Treated Borated Water

Aging Effects Requiring Management

The following aging effects associated with the Waste Processing Liquid Drains System components and commodities require management:

- Loss of Material
- Loss of Pre-Load

Aging Management Programs

The following programs manage the aging effects requiring management for the Waste Processing Liquid Drains System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water System Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Selective Leaching of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.3.2-45, Summary of Aging Management Evaluation – Waste Processing Liquid Drains System, summarizes the results of the aging management review for the Waste Processing Liquid Drains System.

3.3.2.2 AMR Results for Which Further Evaluation is Recommended by the GALL Report

NUREG-1800 indicates that further evaluation is necessary for certain aging effects, particularly those that require plant specific programs. Section 3.0 of NUREG-1800 discusses these aging effects that require further evaluation. The following sections are numbered in accordance with the discussions in Section 3.0 of NUREG-1800 and explain Seabrook Station's approach to these areas requiring further evaluation.

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). This TLAA is addressed separately in Section 4.3, "Metal Fatigue Analysis" or Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses" of this SRP-LR.

At Seabrook Station, the evaluation of metal fatigue as a TLAA for the Chemical and Volume Control System is discussed in Section 4.3.

At Seabrook Station, the evaluation for crane load cycles as a TLAA for Cranes is discussed in Section 4.7.6.

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. The existing program relies on control of water chemistry to manage reduction of heat transfer due to fouling. However, control of water chemistry may have been inadequate. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure that reduction of heat transfer due to fouling is not occurring. A one-time inspection is an acceptable method to ensure that reduction of heat transfer is not occurring and that the component's intended function will be maintained during the period of extended operation.

Item Number 3.3.1-3 is not applicable for Auxiliary Systems components at Seabrook Station. This line item is associated with NUREG-1801 line item VII.E3-6, which is applicable to BWR Reactor Water Cleanup System heat exchangers.

3.3.2.2.3 Cracking due to Stress Corrosion Cracking (SCC)

1. *Cracking due to SCC could occur in the stainless steel piping, piping components, and piping elements of the BWR Standby Liquid Control system that are exposed to sodium pentaborate solution greater than 60°C (>140°F). The existing aging management program relies on monitoring and control of water chemistry to manage the aging effects of cracking due to SCC. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause SCC. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure that SCC is not occurring. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that SCC is not occurring and that the component's intended function will be maintained during the period of extended operation.*

Item Number 3.3.1-4 is applicable to BWRs only. This Item Number is not used by Seabrook Station.

2. *Cracking due to SCC could occur in stainless steel and stainless clad steel heat exchanger components exposed to treated water greater than 60°C (>140°F). The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Item Number 3.3.1.5 is not applicable for Auxiliary System components at Seabrook Station. This line item is associated with NUREG-1801 line items VII.E3-3 and VII.E3-19 which are applicable to BWR Reactor Water Cleanup System heat exchangers.

3. *Cracking due to SCC could occur in stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust. The GALL Report recommends further evaluation of a plant specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage cracking due to stress corrosion cracking for the stainless steel diesel exhaust piping components exposed to diesel exhaust in the Diesel Generator System and Fire Protection System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is described in Appendix B.

3.3.2.2.4 Cracking due to Stress Corrosion Cracking and Cyclic Loading

1. *Cracking due to SCC and cyclic loading could occur in stainless steel PWR non-regenerative heat exchanger components exposed to treated borated water greater than 60°C (>140°F) in the chemical and volume control system. The existing aging management program on monitoring and control of primary water chemistry in PWRs to manage the aging effects of cracking due to SCC. However, control of water chemistry does not preclude cracking due to SCC and cyclic loading. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that cracking is not occurring. The GALL Report recommends that a plant-specific aging management program be evaluated to verify the absence of cracking due to SCC and cyclic loading to ensure that these aging effects are managed adequately. An acceptable verification program is to include temperature and*

radioactivity monitoring of the shell side water, and eddy current testing of tubes.

Seabrook Station will implement the Water Chemistry Program, B.2.1.2, and One-Time Inspection Program, B.2.1.20, to manage cracking due to stress corrosion cracking and cyclic loading of the stainless steel heat exchanger components exposed to treated borated water >140°F in the Chemical and Volume Control system. The Water Chemistry effectiveness will be confirmed by the One-Time Inspection Program. The Water Chemistry and One-Time Inspection Programs are described in Appendix B.

2. *Cracking due to SCC and cyclic loading could occur in stainless steel PWR regenerative heat exchanger components exposed to treated borated water greater than 60°C (>140°F). The existing aging management program relies on monitoring and control of primary water chemistry in PWRs to manage the aging effects of cracking due to SCC. However, control of water chemistry does not preclude cracking due to SCC and cyclic loading. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that cracking is not occurring. The GALL Report recommends that a plant-specific aging management program be evaluated to verify the absence of cracking due to SCC and cyclic loading to ensure that these aging effects are managed adequately. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   The Water Chemistry Program, B.2.1.2 will be used to manage cracking due to stress corrosion cracking and cyclic loading of the stainless steel regenerative heat exchanger components exposed to treated borated water greater than 60°C (>140°F) in the Chemical and Volume Control System. The regenerative heat exchanger is of a welded design that prevents heat exchanger disassembly for access to the heat exchanger internals. The Water Chemistry Program effectiveness will be verified by the one-time inspection of a non-regenerative heat exchanger in the Chemical and Volume Control System with stainless steel components with the same environment to assure this aging effect is not occurring. In addition, the integrity of the regenerative heat exchanger is verified by continuous temperature monitoring. The Water Chemistry Program is discussed in Appendix B.

3. *Cracking due to SCC and cyclic loading could occur for the stainless steel pump casing for the PWR high-pressure pumps in the chemical and volume control system. The existing aging management program relies on monitoring and control of primary water chemistry in PWRs to manage the aging effects of cracking due to SCC. However, control of*

water chemistry does not preclude cracking due to SCC and cyclic loading. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that cracking is not occurring. The GALL Report recommends that a plant-specific aging management program be evaluated to verify the absence of cracking due to SCC and cyclic loading to ensure that these aging effects are managed adequately. Acceptance criteria are described in Branch Technical Position RLSB-1.

Seabrook Station will implement the Water Chemistry Program, B.2.1.2, and One-Time Inspection Program, B.2.1.20, to manage cracking due to stress corrosion cracking and cyclic loading of the stainless steel high-pressure pump casings exposed to treated borated water in the Chemical and Volume Control system. The Water Chemistry effectiveness will be confirmed by the One-Time Inspection Program. The Water Chemistry and One-Time Inspection Programs are described in Appendix B.

4. Item Number 3.3.1-10 is not applicable to the Auxiliary Systems for Seabrook Station. There is no high-strength steel closure bolting exposed to air with steam or water leakage.

3.3.2.2.5 Hardening and Loss of Strength due to Elastomer Degradation

1. *Hardening and loss of strength due to elastomer degradation could occur in elastomer seals and components of heating and ventilation systems exposed to air – indoor uncontrolled (internal/external). The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage hardening and loss of strength due to elastomer degradation of the elastomer components exposed to air-indoor uncontrolled (internal) by in the Containment Building Spray, Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Diesel Generator, Diesel Generator Air Handling, Emergency Feed Water Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, Service Water, Service Water Pump House Air Handling, and Spent Fuel Pool Cooling systems. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is discussed in Appendix B.

Seabrook Station will implement the External Surfaces Monitoring Programs, B.2.1.24, to manage hardening and loss of strength due to elastomer degradation of the elastomer components exposed to air-indoor uncontrolled (external) in the Containment Building Spray, Chemical and Volume Control, Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Dewatering, Diesel Generator, Diesel Generator Air Handling, Emergency Feed Water Pump House Air Handling, Fire Protection System, Fuel Handling, Fuel Storage Building Air Handling, Instrument Air, Miscellaneous Equipment, Primary Auxiliary Building Air Handling, Service Water Pump House Air Handling, and Spent Fuel Pool Cooling systems. The External Surfaces Monitoring Program is discussed in Appendix B.

2. *Hardening loss of strength due to elastomer degradation could occur in elastomer linings of the filters, valves, and ion exchangers in spent fuel pool cooling and cleanup systems (BWR and PWR) exposed to treated water or to treated borated water. The GALL Report recommends that a plant-specific aging management program be evaluated to determine and assesses the qualified life of the linings in the environment to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage loss of material due to hardening and loss of strength of the elastomer components exposed to treated borated water in the Chemical and Volume Control System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is discussed in Appendix B.

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 sheets of BWR and PWR spent fuel storage racks exposed to treated water or to treated borated water. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

Seabrook Station will implement the Boral Monitoring Program, B.2.2.2, to manage reduction of neutron-absorbing capacity and loss of material due to general corrosion of the Boral Poison sheet in Spent

Fuel Racks – in Treated Water exposed to treated borated water. The Boral Monitoring Program is discussed in Appendix B.

3.3.2.2.7 Loss of Material due to General, Pitting, and Crevice Corrosion

1. *Loss of material due to general, pitting, and crevice corrosion could occur in steel piping, piping components, and piping elements, including the tubing, valves, and tanks in the reactor coolant pump oil collection system, exposed to lubricating oil (as part of the fire protection system). The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lubricating oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation. In addition, corrosion may occur at locations in the reactor coolant pump oil collection tank where water from wash downs may accumulate. Therefore, the effectiveness of the program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion, to include determining the thickness of the lower portion of the tank. A one-time inspection is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion. The Lubricating Oil Analysis Program includes a one time thickness measurement on the bottom portion of the steel tanks exposed to lubricating oil in the Oil Collection for Reactor Coolant Pumps System.

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to general, pitting and crevice corrosion of the steel tanks exposed to lubricating oil in the Chemical and Volume Control, Diesel Generator, Instrument Air, and Miscellaneous Equipment systems.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion of the steel piping components exposed to lubricating oil in the Chemical and Volume Control System, Diesel Generator, Fire Protection, Instrument Air, Miscellaneous Equipment, and Service Water systems. In addition, galvanic corrosion is an additional aging mechanism in the steel piping components in the Diesel Generator system.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion of the galvanized steel piping components exposed to lubricating oil in the Service Water System.

The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

Item Number 3.3.1-15 is not applicable at Seabrook Station. There is no steel reactor coolant pump oil collection system piping components exposed to lubricating oil in the Oil Collection for Reactor Coolant Pumps System.

2. *Loss of material due to general, pitting, and crevice corrosion could occur in steel piping, piping components, and piping elements in the BWR reactor water cleanup and shutdown cooling systems exposed to treated water. The existing aging management program relies on monitoring and control of reactor water chemistry to manage the aging effects of loss of material from general, pitting and crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Item Number 3.3.1-17 is applicable to BWRs only. This Item Number is not used by Seabrook Station.

3. *Loss of material due to general (steel only) pitting and crevice corrosion could occur for steel and stainless steel diesel exhaust piping, piping components, and piping elements exposed to diesel exhaust. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage loss of material due to general (steel only), pitting, and crevice corrosion of the steel piping components, steel silencer (Diesel Generator System), and stainless steel piping components exposed to diesel exhaust in the Diesel Generator and Fire Protection systems. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is described in Appendix B.

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 corrosion, and microbiologically-influenced corrosion (MIC) could occur for steel (with or without coating or wrapping) piping, piping components, and piping elements buried in soil. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

Seabrook Station will implement the Buried Piping and Tanks Inspection Program, B.2.1-22, to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion of the steel piping components (with or without coating or wrapping) buried in soil in the Auxiliary Boiler, Control Building Air Handling, Fire Protection, Plant Floor Drain, and Service Water systems. The Buried Piping and Tanks Inspection Program manages buried steel piping and components for loss of material through the use of coatings and wrappings, and periodic inspections. The program relies on preventive measures such as coating and wrapping to mitigate corrosion and periodic inspection of external surfaces to identify coating degradation, if coated, or base metal corrosion, if uncoated. These inspections assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions. The Buried Piping and Tanks Inspection Program is described in Appendix B.

3.3.2.2.9 Loss of Material due to General, Pitting, Crevice, Microbiologically-Influenced Corrosion and Fouling

1. *Loss of material due to general, pitting, crevice, MIC, and fouling could occur for steel piping, piping components, piping elements, and tanks exposed to fuel oil. The existing aging management program relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination to manage loss of material due to corrosion or fouling. Corrosion or fouling may occur at locations where contaminants accumulate. The effectiveness of the fuel oil chemistry control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, crevice, MIC, and fouling to verify the effectiveness of the fuel oil chemistry program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection program, B.2.1.20, to verify the effectiveness of the Fuel Oil Chemistry Program, B.2.1.18, to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling of the steel piping components exposed to fuel oil in the Auxiliary Boiler, Diesel Generator, and Fuel Oil systems. In addition, galvanic corrosion is an additional aging mechanism in the steel piping components in the Auxiliary Boiler System and Fuel Oil System.

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Fuel Oil Chemistry Program, B.2.1.18, to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling of the steel tanks exposed to fuel oil in the Auxiliary Boiler, Diesel Generator, and Fuel Oil systems.

   The Fuel Oil Chemistry and One-Time Inspection Programs are described in Appendix B.

2. *Loss of material due to general, pitting, crevice, MIC, and fouling could occur for steel heat exchanger components exposed to lubricating oil. The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not*

conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lube oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling of the steel heat exchanger components exposed to lubricating oil in the Chemical and Volume Control and Diesel Generator systems. In addition, galvanic corrosion is an additional aging mechanism in the steel heat exchanger components in the Diesel Generator system. The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

3.3.2.2.10 Loss of Material due to Pitting and Crevice Corrosion

1. *Loss of material due to pitting and crevice corrosion could occur in BWR and PWR steel piping with elastomer lining or stainless steel cladding that are exposed to treated water and treated borated water if the cladding or lining is degraded. The existing aging management program relies on monitoring and control of reactor water chemistry to manage the aging effects of loss of material from pitting and crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting, or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Item Number 3.3.1-22 line item is not applicable at Seabrook Station. NUREG 1801 line VII.A3-9 is not applicable since there is no steel with elastomer lining components exposed to treated borated water in the Spent Fuel Pool Cooing System. NUREG 1801 Line VII.A4-12 is applicable to BWR only.

2. *Loss of material due to pitting and crevice corrosion could occur for stainless steel and aluminum piping, piping components, piping elements, and for stainless steel and steel with stainless steel cladding heat exchanger components exposed to treated water. The existing aging management program relies on monitoring and control of reactor water chemistry to manage the aging effects of loss of material from pitting and crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting, or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Item Number 3.3.1-23 is applicable for BWRs only. This Item Number is not used by Seabrook Station.

   Item Number 3.3.1-24 is not applicable for Auxiliary System components at Seabrook Station. This line item is associated with NUREG-1801 line items VII.A4-5, VII.A4-11, VII.E3-7, VII.E3-15, VII.E4-4, and VII.E4-14 which are applicable to BWR Systems only.

3. *Loss of material due to pitting and crevice corrosion could occur for copper alloy HVAC piping, piping components, and piping elements exposed to condensation (external). The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Components in the Chlorination, Containment Air Handling, Containment Enclosure Air Handling, Control Building Air Handling, Screen Wash, Service Water, and Waste Processing Liquid systems have been aligned to this line item based on material, environment and aging effect.

   Seabrook Station will implement the External Surfaces Monitoring Program, B.2.1.24, to manage loss of material due to pitting and crevice corrosion of the copper alloy piping components exposed to condensation (external) in the Chlorination, Screen Wash, Service Water, and Waste Processing Liquid systems. In addition, galvanic corrosion is an additional aging mechanism in the Screen Wash and Waste Processing Liquid systems.

Seabrook Station will implement the External Surfaces Monitoring Program, B.2.1.24, to manage loss of material due to pitting and crevice corrosion of the copper alloy heat exchanger components exposed to condensation (external) in the Containment Air Handling, Containment Enclosure Air Handling, and Control Building Air Handling systems.

The External Surfaces Monitoring Program is discussed in Appendix B.

Seabrook Station will implement the Bolting Integrity Program, B.2.1.9, to manage loss of material due to pitting and crevice corrosion of the copper alloy bolting exposed to condensation (external) in the Service Water system. The Bolting Integrity Program is discussed in Appendix B.

The Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.F1-16 copper alloy in condensation (External) environment exhibits pitting and crevice corrosion. Therefore, the components having an internal environment of condensation would also see pitting and crevice corrosion as an aging effect.

Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage loss of material due to pitting and crevice corrosion of the copper alloy piping components exposed to condensation (internal) in the Control Building Air Handling System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is discussed in Appendix B.

4. *Loss of material due to pitting and crevice corrosion could occur for copper alloy piping, piping components, and piping elements exposed to lubricating oil. The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lubricating oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

Copper alloy heat exchangers in the Chemical and Volume Control and Diesel Generator systems have been aligned to this line item based on material, environment, and aging effect.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to pitting and crevice corrosion of the copper alloy piping components exposed to lubricating oil in the Chemical and Volume Control, Diesel Generator, Instrument Air, Miscellaneous Equipment, Service Water, and Switchyard systems, and copper alloy heat exchanger components exposed to lubricating oil in the Chemical and Volume Control and Diesel Generator systems. The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

5. *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. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Stainless steel piping components in the Fire Protection, Fuel Storage Building Air Handling, Primary Component Cooling Water, Screen Wash, and Service Water systems and stainless bolting in the Primary Component Cooling Water, Screen Wash and Service Water systems have been aligned to this line item number based on material, environment and aging effect.

   Aluminum piping components in the Diesel Generator, Fire Protection, and Instrument Air systems and aluminum heat exchanger components in the Diesel Generator system have been aligned to this line item number based on material, environment and aging effect.

   Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage loss of material due to pitting and crevice corrosion of the aluminum piping components exposed to condensation in the Fire Protection system. In addition galvanic corrosion is an additional aging mechanism. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is described in Appendix B.

   Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage loss of material due to pitting and crevice corrosion of the stainless steel HVAC components and stainless steel piping components exposed to condensation in the Containment Air Handling, Containment Enclosure Air Handling, Fire Protection, and Fuel Storage Building Air Handling systems. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is described in Appendix B.

Seabrook Station will implement the External Surfaces Monitoring Program, B.1.2-24, to manage loss of material due to pitting and crevice corrosion of the Aluminum heat exchanger components exposed to condensation (external) in the Control Building Air Handling system. The External Surfaces Monitoring Program is described in Appendix B.

Seabrook Station will implement the External Surfaces Monitoring Program, B.1.2-24, to manage loss of material due to pitting and crevice corrosion of the stainless steel piping components exposed to condensation (external) in the Primary Component Cooling Water and Service Water systems. The External Surfaces Monitoring Program is described in Appendix B.

The Bolting Integrity Program, B.2.1.9, will be used to manage loss of material due to pitting and crevice corrosion of the stainless steel bolting exposed to condensation (external) in the Primary Component Cooling Water, Screen Wash, and Service Water systems. The Bolting Integrity Program is described in Appendix B.

The Compressed Air Monitoring Program, B.2.1.14, will be used to manage loss of material due to pitting, crevice and galvanic corrosion (an additional aging mechanism) of the aluminum piping components and heat exchanger components (Diesel Generator system) exposed to condensation (internal) in the Diesel Generator System and Instrument Air System. The Compressed Air Monitoring Program is described in Appendix B.

6. *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. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria programs are described in Branch Technical Position RLSB-1.*

   Copper alloy piping components in the Diesel Generator and Instrument Air systems have been aligned to this line item number based on material, environment and aging effect.

The Compressed Air Monitoring Program, B.2.1.14, will be used to manage loss of material due to pitting and crevice corrosion of the copper alloy piping components exposed to condensation in the Diesel Generator and Instrument Air systems and copper alloy tanks exposed to condensation in the Instrument Air system. The Compressed Air Monitoring Program is described in Appendix B.

Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage loss of material due to pitting and crevice corrosion of the copper alloy piping components exposed to condensation in the Fire Protection System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is described in Appendix B.

7. *Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements exposed to soil. The GALL Report recommends further evaluation of a plant specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   The Buried Piping and Tanks Inspection Program, B.2.1.22 will be used to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion (an additional aging mechanism) of the stainless steel piping components exposed to soil in the Diesel Generator system. The Buried Piping and Tanks Inspection program is described in Appendix B.

8. *Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements of the BWR Standby Liquid Control System that are exposed to sodium pentaborate solution. The existing aging management program relies on monitoring and control of water chemistry to manage the aging effects of loss of material due to pitting and crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause loss of material due to pitting and crevice corrosion. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure this aging is not occurring. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that loss of material due to pitting and crevice corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

Item Number 3.3.1-30 is applicable to BWRs only. This item number is not used by Seabrook Station.

3.3.2.2.11 Loss of Material due to Pitting, Crevice, and Galvanic Corrosion

The GALL Report recommends further evaluation of programs to manage the loss of material due to pitting, crevice, and galvanic corrosion of copper alloy piping, piping components, and piping elements that are exposed to treated water. The reviewer reviews the applicant's proposed program on a case-by- case basis to ensure that an adequate program will be in place for the management of these aging effects.

Item Number 3.3.1-31 is applicable to BWRs only. This item number is not used by Seabrook Station.

3.3.2.2.12 Loss of Material due to Pitting, Crevice, and Microbiologically-Influenced Corrosion

1. *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. The existing aging management program relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination to manage loss of material due to corrosion. However, corrosion may occur at locations where contaminants accumulate and the effectiveness of fuel oil chemistry control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the fuel oil chemistry control program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Fuel Oil Chemistry Program, B.2.1.18, to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion of the stainless steel, aluminum, and copper alloy piping components exposed to fuel oil. Stainless steel piping components are in the Auxiliary Boiler, Diesel Generator, and Fuel Oil systems. Aluminum piping components are contained in the Diesel Generator System. In addition, galvanic is an additional aging mechanism. Copper Alloy Components are contained in the Auxiliary Boiler, Diesel Generator, Fire Protection and Fuel Oil systems. In addition, galvanic corrosion is an additional aging mechanism in copper alloy piping components in the Diesel Generator system. The Fuel Oil Chemistry and One-Time Inspection Programs are described in Appendix B.

2. *Loss of material due to pitting, crevice, and MIC could occur in stainless steel piping, piping components, and piping elements exposed to lubricating oil. The existing program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lubricating oil program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion of the stainless steel piping components exposed to lubricating oil in the Chemical and Volume Control, Diesel Generator, Fire Protection, Instrument Air, Miscellaneous Equipment, Oil Collection for Reactor Coolant Pumps, and Switchyard systems, stainless steel drip pan, stainless steel flame arrestor, and stainless steel tank are exposed to lubricating oil in the Oil Collection for RC Pumps system, and stainless steel heat exchanger components are exposed to lubricating oil in the Chemical and Volume Control System. The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

3.3.2.2.13 Loss of Material due to Wear

Loss of material due to wear could occur in the elastomer seals and components exposed to Air-Indoor Uncontrolled (internal or external). The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage loss of material due to wear of the elastomer components exposed to

Air-Indoor Uncontrolled (internal) in the Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Diesel Generator Air Handling, Emergency Feed Water Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, and Service Water Pump House Air Handling systems.

Seabrook Station will implement the External Surfaces Monitoring Program, B.2.1.24, to manage loss of material due to wear of the elastomer components exposed to Air-Indoor Uncontrolled (external) in the Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Diesel Generator Air Handling, Emergency Feed Water Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, and Service Water Pump House Air Handling systems.

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components and the External Surfaces Monitoring Programs are discussed in Appendix B.

3.3.2.2.14 Loss of Material due to Cladding Breach

Loss of material due to cladding breach could occur for PWR steel charging pump casings with stainless steel cladding exposed to treated borated water. The GALL Report references NRC Information Notice 94-63, Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks, and recommends further evaluation of a plant-specific aging management program to ensure that the aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

Item Number 3.3.1-35 is not applicable at Seabrook Station. The Chemical and Volume Control System pumps do not have stainless steel cladding.

3.3.2.2.15 Quality Assurance for Aging Management of Nonsafety-Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.3.2.3 Time-Limited Aging Analyses

The time-limited aging analyses identified below are associated with the Auxiliary Systems components:

- Section 4.3, Metal Fatigue of Piping and Components
- Section 4.6, Crane Load Cycle Limits

3.3.3 CONCLUSION

The Auxiliary System piping and components subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B. These activities demonstrate that the aging effects associated with the Auxiliary Systems will be adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-1	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 is a TLAA; further evaluation is documented in Subsection 3.3.2.2.1.
3.3.1-2	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 is a TLAA; further evaluation is documented in Subsection 3.3.2.2.1.
3.3.1-3	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	Not applicable for Auxiliary Systems components at Seabrook Station. This line item is associated with NUREG-1801 line item VII.E3-6, which is applicable to BWR Reactor Water Cleanup System heat exchangers. See subsection 3.3.2.2.2.
3.3.1-4	BWR Only				
3.3.1-5	Stainless steel and stainless clad steel heat exchanger components exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	A plant specific aging management program is to be evaluated.	Yes, plant specific	Not applicable for Auxiliary Systems components at Seabrook Station. This line item is associated with NUREG-1801 line items VII.E3-3 and VII.E3-19, which is applicable to BWR Reactor Water Cleanup System heat exchangers. See subsection 3.3.2.2.3.2.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-6	Stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Cracking due to stress corrosion cracking	A plant specific aging management program is to be evaluated.	Yes, plant specific	Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage cracking due to stress corrosion cracking of the stainless steel diesel engine exhaust piping components in the Diesel Generator and Fire Protection systems. See subsection 3.3.2.2.3.3.
3.3.1-7	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	Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2 and the One-Time Inspection Program, B.2.1.20, will be used to manage cracking dues to stress corrosion cracking and cyclic loading of the stainless steel non-regenerative heat exchanger components exposed to treated borated water 60°C (>140°F) in the Chemical and Volume Control System. See subsection 3.3.2.2.4.1.
3.3.1-8	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 Water Chemistry Program, B.2.1.2 will be used to manage cracking due to stress corrosion cracking and cyclic loading of the stainless steel regenerative heat exchanger components exposed to treated borated water 60°C (>140°F) in the Chemical and Volume Control System. The regenerative heat exchanger is of a welded design that prevents heat exchanger disassembly for access to the heat exchanger internals. The Water Chemistry program effectiveness will be verified by the one-time inspection of another non-regenerative heat exchanger in the Chemical and Volume Control System with stainless steel components with the same the same environment to assure this aging effect is not occurring. In addition, the integrity of the regenerative heat exchanger is verified by continuous temperature monitoring. See subsection 3.3.2.2.4.2.
3.3.1-9	Stainless steel high-pressure pump casing in PWR	Cracking due to stress corrosion cracking and cyclic	Water Chemistry and a plant specific verification program.	Yes, plant specific	Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2 and the One-Time Inspection Program, B.2.1.20, will be used to manage cracking due to stress corrosion cracking and

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	chemical and volume control system	loading	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.		cyclic loading of stainless steel high-pressure pump casings exposed to treated borated water in the Chemical and Volume Control system. See subsection 3.3.2.2.4.3.
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	Not Applicable. There is no high strength steel closure bolting exposed to air with steam or water leakage in the Auxiliary Systems at Seabrook Station. See 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	A plant specific aging management program is to be evaluated.	Yes, plant specific	Consistent with NUREG-1801 with exceptions. Components in the Containment Building Spray system have been aligned to this line item due to material, environment, and aging effect. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to hardening and loss of strength of the elastomer components exposed to air-indoor uncontrolled (internal) in the Containment Building Spray, Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Diesel Generator, Diesel Generator Air Handling, Emergency Feed Water Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, Service Water Pump House Air Handling, and Spent Fuel Pool Cooling systems.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to hardening and loss of strength of the elastomer components exposed to air-indoor uncontrolled (external) in the Containment Building Spray, Chemical and Volume Control, Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On Line Purge, Control Building Air Handling, Dewatering, Diesel Generator Air Handling, Diesel Generator, Emergency Feed Water Pump House Air Handling, Fire Protection, Fuel Handling, Fuel Storage Building Air Handling, Instrument Air, Miscellaneous Equipment, Primary Auxiliary Building Air Handling, Service Water Pump House Air Handling, and Spent Fuel Pool Cooling systems. See 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 is to be evaluated.	Yes, plant specific	Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to hardening and loss of strength of the elastomer components exposed to treated borated water in the Chemical and Volume Control system. See 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	A plant specific aging management program is to be evaluated.	Yes, plant specific	Consistent with NUREG-1801. Seabrook Station will implement the Boral Monitoring Program, B.2.2.2, to manage reduction of neutron- absorbing capacity and loss of material due to general corrosion of the Boral Poison sheet in Spent Fuel Racks - in Treated Water exposed to treated borated water. See Subsection 3.3.2.2.6.
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	Consist with NUREG-1801 with exceptions. Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions) B.2.1.26, to manage loss of material due to general, pitting and crevice corrosion of the steel tanks exposed to

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					lubricating oil in the Diesel Generator, Instrument Air, and Miscellaneous Equipment systems. Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion of the steel piping components in the Chemical and Volume Control System, Diesel Generator, Fire Protection, Instrument Air, Miscellaneous Equipment, and Service Water systems. In addition, galvanic corrosion is an additional aging mechanism in the steel piping components in the Diesel Generator system. Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion of the galvanized steel piping components in the Service Water System. See 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	Not applicable at Seabrook Station. There is no steel reactor coolant pump oil collection system piping components exposed to lubricating oil in the Oil Collection for Reactor Coolant Pumps System. See 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	Chemical and Volume Control system has been aligned to this line item number based on material, environment and aging effect. Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion and a one time thickness measurement of the bottom of the steel tanks exposed to lubricating oil in the Oil Collection for the Reactor Coolant Pumps

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					system. Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion of the steel tanks exposed to lubricating oil in the Chemical and Volume Control System. See 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	A plant specific aging management program is to be evaluated.	Yes, plant specific	Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to general (steel only), pitting and crevice corrosion of the steel and stainless steel piping components and steel silencer component (Diesel Generator system) exposed to diesel exhaust in the Diesel Generator and Fire Protection systems. See subsection 3.3.2.2.7.3.
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 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	Consistent with NUREG-1801 with exceptions. The Buried Piping and Tanks Inspection Program (with exceptions), B.2.1.22, will be used to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion of the steel piping components (with or without coating or wrapping) exposed to soil in the Auxiliary Boiler, Control Building Air Handling, Fire Protection, Plant Floor Drain, and Service Water systems. See 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 microbiologically influenced corrosion,	Fuel Oil Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated)	Consistent with NUREG-1801 with exceptions. Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Fuel Oil Chemistry Program (with exceptions), B.2.1.18, to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
		and fouling			fouling of the following steel components exposed to fuel oil: *a)* Steel piping components exposed to fuel oil in the Auxiliary Boiler, Diesel Generator, and Fuel Oil systems. In addition, galvanic corrosion is an additional aging mechanism in the steel piping components in the Auxiliary Boiler System and Fuel Oil System. *b)* Steel tanks exposed to fuel oil in the Auxiliary Boiler, Diesel Generator, and Fuel Oil systems. See subsection 3.3.2.2.9.1.
3.3.1-21	Steel heat exchanger components exposed to lubricating oil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exceptions. Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling of the steel heat exchanger components exposed to lubricating oil in the Chemical and Volume Control and Diesel Generator systems. In addition, galvanic corrosion is an additional aging mechanism in the steel heat exchanger components in the Diesel Generator system. See subsection 3.3.2.2.9.2.
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	Line item 3.3.1-22 is not applicable at Seabrook Station. NUREG 1801 line VII.A3-9 is not applicable since there is no steel with elastomer lining components exposed to treated borated water in the Spent Fuel Pool Cooing System. NUREG 1801 LINE VII.A4-12 is applicable to BWR only. See 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	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Not applicable for Auxiliary System components at Seabrook Station. This line item is associated with NUREG-1801 line items VII.A4-5, VII.A4-11, VII.E3-7, VII.E3-15, VII.E4-4, and VII.E4-14 which are applicable to BWR components.

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Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	exposed to treated water				See 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	Components in the Chlorination, Containment Air Handling, Containment Enclosure Air Handling, Control Building Air Handling, Screen Wash, Service Water, and Waste Processing Liquid systems have been aligned to this line item based on material, environment and aging effect. Consistent with NUREG-1801 with exceptions. Seabrook Station will implement the External Surfaces Monitoring Program (with exceptions), B.2.1.24, to manage loss of material due to pitting and crevice corrosion of the following copper alloy components exposed to condensation (external): a) Copper alloy piping components exposed to condensation (external) in the Chlorination, Screen Wash, Service Water, and Waste Processing Liquid systems. In addition, galvanic corrosion is an additional aging mechanism in the Screen Wash and Waste Processing Liquid systems. b) Copper alloy heat exchanger components exposed to condensation (external) in the Containment Air Handling, Containment Enclosure Air Handling, and Control Building Air Handling systems. Consistent with NUREG-1801. Seabrook Station will implement the Bolting Integrity Program, B.2.1.9, to manage loss of material due to pitting and crevice corrosion of the copper alloy bolting exposed to condensation (external) in the Service Water system. The Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.F1-16 copper alloy in condensation (External) environment exhibits pitting and crevice corrosion. Therefore, the components having an internal environment of condensation would also see pitting and crevice

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					corrosion as an aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to pitting and crevice corrosion of the copper alloy piping components exposed to condensation (internal) in the Control Building Air Handling System. See 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	Copper alloy heat exchanger components in the Chemical and Volume Control and Diesel Generator systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to pitting and crevice corrosion of the copper alloy piping components, and copper alloy heat exchanger components exposed to lubricating oil. a) Copper alloy piping components in the Chemical and Volume Control, Diesel Generator, Instrument Air, Miscellaneous Equipment, Service Water, and Switchyard systems. b) Copper alloy heat exchanger components in the Chemical and Volume Control System and Diesel Generator Systems. See subsection 3.3.2.2.10.4.
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	Stainless steel piping components in the Fire Protection, Fuel Storage Building Air Handling, Primary Component Cooling Water System, Screen Wash, and Service Water systems and stainless steel bolting in the Primary Component Cooling Water, Screen Wash and Service Water systems have been aligned to this line item number based on material, environment and aging effect.

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Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Aluminum piping components in the Diesel Generator, Fire Protection and Instrument Air systems and aluminum heat exchanger components in the Diesel Generator system have been aligned to this line item number based on material, environment and aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to pitting and crevice corrosion of the aluminum piping components exposed to condensation in the Fire Protection system. In addition galvanic corrosion is an additional aging mechanism. Consistent with NUREG-1801. The Bolting Integrity Program, B.2.1.9, will be used to manage loss of material due to pitting, and crevice corrosion of the stainless steel bolting exposed to condensation (external) in the Primary Component Cooling Water, Screen Wash and Service Water systems. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to pitting and crevice corrosion of the stainless steel HVAC components and stainless steel piping components exposed to condensation (internal) in the Containment Air Handling, Containment Enclosure Air Handling, and Fuel Storage Building Air Handling systems. Consistent with NUREG-1801 with exceptions. The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to pitting and crevice corrosion of the aluminum heat exchanger components exposed to condensation (external) in the Control Building Air Handling System. Consistent with NUREG-1801 with exceptions. The External

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to pitting and crevice corrosion of the stainless steel piping components exposed to condensation (external) in the Primary Component Cooling Water, Screen Wash, and Service Water systems. Consistent with NUREG-1801. The Compressed Air Monitoring Program, B.2.1.14, will be used to manage loss of material due to pitting, crevice and galvanic corrosion (an additional aging mechanism) of the aluminum piping components and heat exchanger components (Diesel Generator system) exposed to condensation (internal) in the Diesel Generator and Instrument Air systems. See 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	Copper alloy piping components in the Diesel Generator and Instrument Air systems and copper alloy tanks in the Instrument Air system have been aligned to this line item number based on material, environment and aging effect. Consistent with NUREG-1801. The Compressed Air Monitoring Program, B.2.1.14, will be used to manage loss of material due to pitting and crevice corrosion of the copper alloy piping components exposed to condensation in the Diesel Generator and Instrument Air systems and copper alloy tanks exposed to condensation in the Instrument Air system. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to pitting and crevice corrosion of the copper alloy piping components exposed to condensation in the Fire Protection System. See subsection 3.3.2.2.10.6.
3.3.1-29	Stainless steel piping, piping	Loss of material due to pitting and crevice	A plant-specific aging management	Yes, plant specific	Consistent with NUREG-1801 with exceptions. The Buried Piping and Tanks Inspection Program (with exceptions), B.2.1.22, will be

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	components, and piping elements exposed to soil	corrosion	program is to be evaluated.		used to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion (an additional aging mechanism) of the stainless steel piping components exposed to soil in the Diesel Generator system. See subsection 3.3.2.2.10.7.
3.3.1-30	BWR Only				
3.3.1-31	BWR Only				
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 microbiologically influenced corrosion	Fuel Oil Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Fuel Oil Chemistry Program (with exceptions), B.2.1.18, to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion of the stainless steel, aluminum, and copper alloy piping components exposed to fuel oil a) Stainless steel piping components are in the Auxiliary Boiler, Diesel Generator, and Fuel Oil systems b) Aluminum piping components are in the Diesel Generator system. In addition, galvanic is an additional aging mechanism c) Copper alloy piping components are in the Auxiliary Boiler, Diesel Generator, Fire Protection, and Fuel Oil systems. In addition, galvanic corrosion is an additional aging mechanism in the copper alloy piping components in the Diesel Generator system. See 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 microbiologically influenced corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Components in the Chemical and Volume Control and Oil Collection for Reactor Coolant Pumps systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion of the following

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					stainless steel components exposed to lubricating oil: *a)* Stainless steel piping components exposed to lubricating oil in the Chemical and Volume Control, Diesel Generator, Fire Protection, Instrument Air, Miscellaneous Equipment, Oil Collection for Reactor Coolant Pumps, and Switchyard systems. *b)* Stainless steel drip pans, stainless steel flame arrestors, and stainless steel tanks exposed to lubricating oil in the Oil Collection for Reactor Coolant Pumps system. c) Stainless steel heat exchanger components exposed to lubricating oil are contained in the Chemical and Volume Control system. See 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	A plant specific aging management program is to be evaluated.	Yes, plant specific	Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to wear of the elastomer components exposed to air-indoor uncontrolled (internal) in the Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Diesel Generator Air Handling, Emergency Feed Water Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, and Service Water Pump House Air Handling systems The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to wear of the elastomer components exposed to air-indoor uncontrolled (external) in the Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Diesel Generator Air Handling, Emergency Feed Water Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, and Service Water Pump House Air Handling systems. See subsection 3.3.2.2.13.

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Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-35	Steel with stainless steel cladding pump casing exposed to treated borated water	Loss of material due to 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	Line item 3.3.1-35 is not applicable at Seabrook Station. The Chemical and Volume Control System pumps do not have stainless steel cladding. See subsection 3.3.2.2.14.
3.3.1-36	BWR Only				
3.3.1-37	BWR Only				
3.3.1-38	BWR Only				
3.3.1-39	BWR Only				
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	Components in the Auxiliary Boiler and Fire systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Aboveground Steel Tanks Program, B.2.1.17, will be used to manage loss of material due to general, pitting, and crevice corrosion of the steel tanks exposed to air-outdoor (external) in the Auxiliary Boiler, Fire Protection, and Fuel Oil systems.
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	Not applicable at Seabrook Station. There is no high strength steel closure bolting in the Auxiliary Systems.

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Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	All steel bolting was aligned with line item 3.3.1-43 that has an external environment of Air-Indoor Uncontrolled, which includes pitting and crevice corrosion and uses the Bolting Integrity Program for managing these aging effects and therefore, Seabrook Station did not use steel bolting in this environment.
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. The Bolting Integrity Program, B.2.1.9, will be used to manage loss of material due to general, pitting, and crevice corrosion of the steel bolting exposed to air-indoor uncontrolled in the Auxiliary Boiler, Chemical and Volume Control, Containment Air Purge, Containment Enclosure Air Handling, Containment On Line Purge, Control Building Air Handling, Diesel Generator, Fire Protection, Fuel Handling, Hot Water Heating, Instrument Air, Mechanical Seal Supply, Miscellaneous Equipment, Nitrogen Gas, Plant Floor Drain, Potable Water, Primary Auxiliary Building Air Handling, Primary Component Cooling Water, Radiation Monitoring, Release Recovery, Roof Drains, Sample, Spent Fuel Pool Cooling, Waste Gas, and Waste Processing Liquid Drains systems and steel bolting exposed to air outdoor in the Auxiliary Boiler, Fuel Oil, and Switchyard systems.
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	Steel bolting in the Chlorination, Circulating Water, Hot Water Heating, Primary Component Cooling Water, Screen Wash, Service Water, and Waste Processing Liquid systems have been aligned to this line item number based on material, environment and aging effect. Consistent with NUREG-1801. The Bolting Integrity Program, B.2.1.9, will be used to manage loss of material due to general, pitting, and crevice corrosion of the steel bolting exposed to condensation in the Chlorination, Circulating Water, Hot Water Heating, Primary Component Cooling Water, Screen Wash, Service Water, and Waste Processing Liquid systems. In addition, galvanic corrosion is an additional aging mechanism in the Service Water and Waste Processing Liquid systems. Steel bolting in the Instrument Air System was aligned with line item 3.3.1-43 that has an external environment of air-indoor

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					uncontrolled which includes general, pitting and crevice corrosion and uses the Bolting Integrity Program for managing these aging effects. Therefore, Seabrook Station did not use steel bolting in condensation in the Instrument Air system bolting.
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.The Bolting Integrity Program, B.2.1.9, will be used to manage loss of preload due to thermal effects, gasket creep, and self-loosening of the steel bolting exposed to air-indoor uncontrolled (external) in the Auxiliary Boiler, Chemical and Volume Control, Chlorination, Containment Air Purge, Containment Enclosure Air Handling, Containment On Line Purge, Control Building Air Handling, Diesel Generator, Fire Protection, Fuel Handling, Hot Water Heating, Instrument Air, Mechanical Seal Supply, Miscellaneous Equipment, Nitrogen Gas, Plant Floor Drain, Potable Water, Primary Auxiliary Building Air Handling, Primary Component Cooling Water, Radiation Monitoring, Release Recovery, Roof Drains, Sample, Service Water, Spent Fuel Pool Cooling, Waste Gas, and Waste Processing Liquid Drains systems.
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	Not applicable at Seabrook Station. NUREG-1801 line items VII.C2-11, VII.E3-2, VII.E3-13, and VII.E4-11 were not used at Seabrook Station.
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	Components in the Steam Generator Blowdown system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage loss of material due to general, pitting, crevice corrosion of the steel piping components and tanks exposed to closed cycle cooling water.

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Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Steel piping components are contained in the Chemical and Volume Control, Containment Enclosure Air Handling, Control Building Air Handling, Diesel Generator, Primary Auxiliary Building Air Handling, Primary Component Cooling Water, Spent Fuel Pool Cooling, Steam Generator Blowdown, and Waste Processing Liquid Drains systems. Steel tanks are contained in the Control Building Air Handling, Diesel Generator, Primary Component Cooling Water, and Waste Processing Liquid Drains systems. In addition, galvanic corrosion is an additional aging mechanism in the steel piping components in the Control Building Air Handling, Diesel Generator, Primary Component Cooling Water, and Spent Fuel Pool Cooling systems.
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	Components in Reactor Coolant System have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage loss of material due to general, pitting, crevice, and galvanic corrosion of the steel heat exchanger components exposed to closed-cycle cooling water in the Chemical and Volume Control, Diesel Generator, Mechanical Seal Supply, Primary Component Cooling Water (galvanic not applicable since components not in contact with more noble material), Reactor Coolant, Sample, Spent Fuel Pool Cooling, and Waste Processing Liquid Drains systems.
3.3.1-49	Stainless steel; steel with stainless steel cladding heat exchanger components exposed to closed cycle cooling water	Loss of material due to microbiologically influenced corrosion	Closed-Cycle Cooling Water System	No	Not applicable for Auxiliary Systems components at Seabrook Station. This line item is associated with NUREG-1801 line item VII.E3-1 and VII.E4-1, which are applicable to BWR systems only.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	Components in the Chemical and Volume Control and Control Building Air Handling systems were aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage loss of material due to pitting and crevice corrosion of the following stainless components exposed to closed-cycle cooling water: a) Stainless steel piping components are contained in the Chemical and Volume Control, Containment Enclosure Air Handling, Control Building Air Handling, Diesel Generator, Primary Component Cooling Water, Radiation Monitoring, Spent Fuel Pool Cooling, and Waste Processing Liquid Drains systems. b) Stainless steel tanks are contained in the Control Building Air Handling system. c) Stainless steel heat exchanger components are contained in the Chemical and Volume Control and Primary Component Cooling Water systems.
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 exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage loss of material due to pitting, crevice, and galvanic corrosion of the copper alloy piping components and copper alloy heat exchanger components exposed to closed cycle cooling water. Copper alloy piping components are contained in the , Containment Enclosure Air Handling, Control Building Air Handling, Diesel Generator, and Primary Component Cooling Water systems. Copper alloy heat exchanger components are contained in the Chemical and Volume Control, Containment Air Handling, Containment Enclosure Air Handling, Control Building Air Handling, and Diesel Generator systems. In addition, a) Copper alloy heat exchanger components in the Containment Air Handling, Control Building Air Handling, and Diesel Generator systems are not in contact with a more noble material and

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					therefore, galvanic corrosion is not applicable. b) Copper alloy heat exchanger components, copper alloy filter housings, and copper alloy valves in the Containment Enclosure Air Handling system are not in contact with a more noble material and therefore, galvanic corrosion is not applicable. c) Copper alloy piping components in the Control Building Air Handling and Primary Component Cooling Water systems are not in contact with a more noble material and therefore, galvanic corrosion is not applicable.
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	Components in the Reactor Coolant system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System Program (with exceptions), B.2.1.12, will be used to manage reduction of heat transfer due to fouling of the stainless steel and copper alloy heat exchanger tubes exposed to closed-cycle cooling water. Stainless steel heat exchanger tubes are contained in the Chemical and Volume Control, Primary Component Cooling Water, Reactor Coolant, and Spent Fuel Pool Cooling systems. Copper alloy heat exchanger tubes are contained in the .Chemical and Volume Control, Containment Air Handling, Containment Enclosure Air Handling, Control Building Air Handling, and Diesel Generator systems. There are no steel heat exchanger tubes exposed to closed-cycle cooling water in the Auxiliary Systems.
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	Components in the Instrument Air system have been aligned to this line item based on material, environment, and aging effect Consistent with NUREG-1801. The Compressed Air Monitoring Program, B.2.1.14, will be used to manage loss of material due to general and pitting corrosion of the steel compressed air system piping components, steel heat exchanger components, and steel tanks exposed to condensation (internal) in the Instrument Air system. In addition, a) Crevice corrosion is an additional aging mechanism of the steel compressed air system piping components, steel heat exchanger components and steel tanks.

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Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					b) Galvanic corrosion is an additional aging mechanism of the steel compressed air system piping components and steel heat exchanger components.
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	Components in the Instrument Air system have been aligned to this line item based on material, environment, and aging effect Consistent with NUREG-1801. The Compressed Air Monitoring Program, B.2.1.14, will be used to manage loss of material due to pitting and crevice corrosion of the stainless steel compressed air system piping components and stainless steel heat exchanger components(Instrument Air System) exposed to condensation (internal) in the Diesel Generator and Instrument Air systems. Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.D-4, stainless steel in a condensation (Internal) environment exhibits loss of material due to pitting and crevice corrosion. Therefore, stainless steel in a condensation (external) environment will exhibit the same aging effects/mechanisms. The Compressed Air Monitoring Program, B.2.1.14, will be used to manage loss of material due to pitting and crevice corrosion of the stainless steel compressed air piping components exposed to condensation (external) in the Diesel Generator and Instrument Air systems. Components in the Containment Enclosure Air Handling, Vent Gas, and Main Steam systems have been aligned to this item number based on material, environment and aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage loss of material due to pitting and crevice corrosion of the following stainless steel components exposed to condensation (internal): a) Stainless steel piping components in the Containment

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Enclosure Air Handling, Vent Gas, and Main Steam systems, and b) Stainless Steel tanks in the Vent Gas system. Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.D-4 stainless steel in a condensation (Internal) environment exhibits loss of material due to pitting and crevice corrosion. Therefore, stainless steel in a condensation (external) environment will exhibit the same aging effects/mechanisms. Components in the Hot Water Heating and Waste Processing Liquid systems have been aligned to this item number based on material, environment and aging effect. Consistent with NUREG-1801 with exceptions. The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be substituted to manage loss of material due to pitting and crevice corrosion for stainless steel piping components exposed to condensation (external) in the Hot Water Heating and Waste Processing Liquid systems.
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	Consistent with NUREG-1801 with exceptions. The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to general corrosion of steel ducting closure bolting exposed to air-indoor uncontrolled (external) in the Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On Line Purge, Diesel Generator Air Handling, Emergency Feed Water Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, and Service Water Pump House Air Handling systems.
3.3.1-56	Steel HVAC ducting and components external surfaces exposed to air-indoor uncontrolled	Loss of material due to general corrosion	External Surfaces Monitoring	No	Components in the Diesel Generator system and Auxiliary Boiler system were aligned with this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The External

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	(external)				Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to general corrosion of the steel HVAC ducting and components external surfaces exposed to air-indoor uncontrolled (external) in the Auxiliary Boiler, Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On Line Purge, Control Building Air Handling, Diesel Generator Air Handling, Diesel Generator, Emergency Feed Water Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, and Service Water Pump House Air Handling systems. Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.F4-1steel in an indoor uncontrolled air (external) environment exhibits loss of material due to general corrosion. Therefore, steel in an indoor uncontrolled air (internal) environment will exhibit the same aging effects/mechanisms. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to general corrosion of the steel fan housing exposed to air-indoor uncontrolled (internal) in the Diesel Generator system.
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	Consistent with NUREG-1801 with exceptions. The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to general corrosion of the steel piping components external surfaces exposed to air-indoor uncontrolled (external) in the Instrument Air system.
3.3.1-58	Steel external surfaces exposed to air-indoor uncontrolled (external), air-outdoor (external), and condensation	Loss of material due to general corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801 with exceptions. The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to general corrosion of the steel external surfaces exposed to air-indoor uncontrolled (external), air-outdoor (external),and condensation (external). Steel external components exposed to air indoor uncontrolled (external) are in the Auxiliary Boiler, Boron Recovery, Chemical

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	(external)				and Volume Control, Chlorination, Containment Air Purge, Containment Enclosure Air Handling, Demineralized Water, Dewatering, Diesel Generator, Fire Protection, Fuel Handling, Fuel Oil, Fuel Storage Building Air Handling, Hot Water Heating, Mechanical Seal Supply, Miscellaneous Equipment, Nitrogen Gas, Oil Collection for RC Pumps, Plant Floor Drain, Potable Water, Primary Auxiliary Building Air Handling, Primary Component Cooling Water, Reactor Make-Up Water, Release Recovery, Roof Drains, Sample, Spent Fuel Pool Cooling, Waste Gas, Waste Processing Liquid, and Waste Processing Liquid Drains systems. Steel external components exposed to air outdoor (external) are contained in the Instrument Air system. In addition pitting and crevice are additional aging mechanisms. Steel external surfaces exposed to condensation are contained in the Chlorination, Hot Water Heating, Primary Component Cooling Water, Screen Wash, Service Water, and Waste Processing Liquid systems. In addition, pitting, crevice, and galvanic corrosion are additional aging mechanisms in the Chlorination, Screen Wash, Service Water System, and Waste Processing Liquid systems. In addition pitting and crevice are additional aging mechanisms in the Hot Water Heating and Primary Component Cooling Water systems.
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 with exceptions. The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to general, pitting, and crevice corrosion of the steel heat exchanger components exposed to air-indoor uncontrolled (external) in the Diesel Generator and Fire Protection systems.
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 with exceptions. The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to general, pitting, and crevice corrosion of the following steel components exposed to air-outdoor a) Steel piping components exposed to air-outdoor in the Auxiliary Boiler, Control Building Air Handling, Diesel Generator, Fire

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Protection, Fuel Oil, Service Water, and Switchyard systems. In addition, galvanic corrosion is an additional aging mechanism in the Fuel Oil and Service Water systems and, b) Galvanized steel piping components exposed to air-outdoor in the Fire Protection and Service Water systems. In addition galvanic corrosion is an additional aging mechanism in the Service Water System.
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	Not applicable to the Auxiliary Systems at Seabrook Station. Increased hardness, shrinkage and loss of strength of elastomers exposed to air-indoor uncontrolled and air-outdoor is managed by the Fire Protection Program, B.2.1.15 and the Structures Monitoring Program, B.2.1.31 at Seabrook Station (See Section 3.5).
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	Not applicable at Seabrook Station. There are no aluminum piping components exposed to raw water in the Auxiliary Systems at Seabrook Station
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	Not applicable to the Auxiliary Systems at Seabrook Station. Wear of steel fire doors exposed to air-outdoor or air-indoor uncontrolled is managed by the Fire Protection Program, B.2.1.15 at Seabrook Station. (See Section 3.5)
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. The Fire Protection Program, B.2.1.15, and the Fuel Oil Chemistry Program (with exceptions), B.2.1.18, will be used to manage loss of material due to general, pitting, and crevice corrosion of the steel piping components exposed to fuel oil in the Fire Protection and Fuel Oil systems. In addition, galvanic and microbiologically influenced corrosion, and fouling are additional aging mechanisms in the Fire Protection and Fuel Oil systems.
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	Not applicable to the Auxiliary Systems at Seabrook Station however, cracking and spalling, aggressive chemical attack of reinforced concrete structural fire barriers exposed to indoor air is managed by the Fire Protection Program, B.2.1.15, and Structural Monitoring Program, B.2.1.31, at Seabrook Station. (In Section 3.5).

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Not applicable at Seabrook Station. There are no reinforced concrete structural fire barriers – walls, ceiling and floors exposed to air-outdoor and subject to cracking and spalling due to freeze thaw.
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	Not applicable to the Auxiliary Systems at Seabrook Station however, loss of material of reinforced concrete structural fire barriers exposed to air is managed by the Fire Protection Program, B.2.1.15, and Structural Monitoring Program, B.2.1.31, at Seabrook Station. (In Section 3.5)
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	Steel tanks and steel vortex plate in the Fire Protection system were aligned with this line item based on material, environment, and aging effect. Consistent with the NUREG 1801. The Fire Water System Program, B.2.1.16, will be used to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling of the steel piping components, steel tanks and steel vortex plate exposed to raw water in the Fire Protection System. In addition, galvanic corrosion is an additional aging mechanism in the steel piping components in the Fire Protection system. Components in the Chlorination, Dewatering, Plant Floor Drain, Potable Water, Roof Drains, Screen Wash, Waste Processing Liquid, and Waste Processing Liquid Drains systems, have been aligned to this item number based on material, environment and aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion and fouling (except Potable Water System) of the following steel components

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					exposed to raw water. a) Steel piping components in the Chlorination, Dewatering, Plant Floor Drain, Potable Water, Roof Drains, Screen Wash, Waste Processing Liquid, and Waste Processing Liquid Drains systems. In addition, galvanic corrosion is an additional aging mechanism for the Chlorination, Dewatering, Plant Floor Drain, Potable Water, Screen Wash, Waste Processing Liquid, and Waste Processing Liquid Drains systems, and fouling is not applicable to Potable Water system. b) Steel tanks in the Plant Floor Drain and Potable Water systems.
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	Consistent with the NUREG 1801. The Fire Water System Program, B.2.1.16, will be used to manage loss of material due to pitting and crevice corrosion, and fouling of the stainless steel piping components exposed to raw water in the Fire Protection system. In addition, microbiologically influenced corrosion is an additional aging mechanism in the Fire protection system. Components in the Plant Floor Drain, Potable Water, and Waste Processing Liquid Drains systems have been aligned to this item number based on material, environment and aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage loss of material due to pitting and crevice corrosion, and fouling of the stainless steel piping components exposed to raw water in the Plant Floor Drain System, Potable Water System, and Waste Processing Liquid Drains System. In addition, microbiologically influenced corrosion is an additional aging mechanism for the Plant Floor Drain, Potable Water, and Waste Processing Liquid Drains systems, and fouling is not applicable to the Potable Water system.
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,	Fire Water System	No	Consistent with the NUREG 1801. The Fire Water System Program, B.2.1.16, will be used to manage loss of material due to pitting, crevice, microbiologically influenced corrosion, and fouling of the copper alloy piping components exposed to raw water in the Fire Protection system.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
		and fouling			Components in the Potable Water System have been aligned to this item number based on material, environment and aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion of the copper alloy piping components exposed to raw water in the Potable Water system. In addition, *a)* galvanic corrosion is an additional aging mechanism in the Potable Water system, fouling is not applicable to the Potable Water system.
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	Consistent with the NUREG 1801.The Compressed Air Monitoring Program, B.2.1.14, will be substituted to manage loss of material due to general, pitting, and crevice corrosion of the steel piping components exposed to condensation in the Diesel Generator system. In addition galvanic corrosion is an additional aging mechanism. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to general, pitting, and crevice corrosion of the steel piping components exposed to condensation in the Fire Protection System. In addition galvanic corrosion is an additional aging mechanism.
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) microbiologically influenced corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion for the following steel components exposed to condensation (internal). *a)* Galvanized steel tanks in Control Building Air Handling system. *b)* Steel drip pans in the Control Building Air Handling system.
3.3.1-73	Steel crane structural girders in load handling	Loss of material due to general corrosion	Inspection of Overhead Heavy Load and Light Load	No	Not applicable to the Auxiliary Systems at Seabrook Station however, loss of material of steel crane structural girders is managed by the Inspection of Overhead Heavy Load and Light

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	system exposed to air-indoor uncontrolled (external)		(Related to Refueling) Handling Systems		Load (Related to Refueling) Handling Systems Program, B.2.1.13, and Structural Monitoring Program, B.2.1.31, at Seabrook Station. (In Section 3.5).
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	Not applicable to the Auxiliary Systems at Seabrook Station however, wear of crane rails exposed to air is managed by the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program, B.2.1.13, and Structural Monitoring Program, B.2.1.31, at Seabrook Station. (In Section 3.5)
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	Components in the Circulating Water and Dewatering systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG 1801 with exceptions. The Open-Cycle Cooling Water System Program (with exceptions), B.2.1.11, will be used to manage hardening and loss of strength due to elastomer degradation and loss of material due to erosion of the elastomer components exposed to raw water in the Service Water and Circulating Water systems. Consistent with NUREG 1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage hardening and loss of strength due to elastomer degradation and loss of material due to erosion for elastomer components exposed to raw water in the Dewatering system. The raw water in the Dewatering system is ground water and therefore, the Open-Cycle Cooling Water System Program is not applicable.
3.3.1-76	Steel piping, piping components, and piping elements (without lining/coating or with degraded	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, fouling, and	Open-Cycle Cooling Water System	No	Components in the Circulating Water system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Open-Cycle Cooling Water System Program (with exceptions), B.2.1.11, will

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	lining/coating) exposed to raw water	lining/coating degradation			be used to manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, fouling, and lining/coating degradation of the steel piping components exposed to raw water in the Service Water and Circulating Water systems. In addition, galvanic corrosion is an additional aging mechanism for the Service Water and Circulating Water systems.
3.3.1-77	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	Components in the Fire Protection system have been aligned to this item number based on material, environment and aging effect. Consistent with NUREG 1801. The Fire Water System Program, B.2.1.16, will be substituted to manage loss of material due to general, pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling of the steel heat exchanger components exposed to raw water in the Fire Protection system. There are no steel heat exchanger components in the Service Water system exposed to raw water.
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	Components in the Circulating Water system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Open-Cycle Cooling Water System Program (with exceptions), B.2.1.11, will be used to manage loss of material due to pitting and crevice corrosion of the nickel alloy piping components exposed to raw water in the Service Water and Circulating Water systems. In addition, fouling and microbiologically influenced corrosion are additional mechanisms for the Service Water and Circulating Water systems. Components in the Chlorination and Screen Wash systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG 1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					substituted to manage loss of material due to pitting and crevice corrosion of the nickel alloy piping components exposed to raw water in the Chlorination and Screen Wash systems. In addition, microbiologically influenced corrosion and fouling are additional aging mechanisms for the Chlorination and Screen Wash systems. The copper alloy piping components were not aligned to NUREG 1801 line item VII.C3-2 in the Auxiliary Systems. The stainless steel piping components were not aligned to NUREG 1801 line item VII.C3-7 in the Auxiliary Systems.
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	Consistent with NUREG-1801 with exceptions. The Open-Cycle Cooling Water System Program (with exceptions), B.2.1.11, will be used to manage loss of material due to pitting and crevice corrosion, and fouling of the stainless steel piping components exposed to raw water in the Service Water system. In addition, microbiologically influenced corrosion is an additional aging mechanism for the Service Water system. Components in the Dewatering, Screen Wash, and Service Water systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG 1801. The Bolting Integrity Program, B.2.1.9, will be used to manage loss of material due to pitting and crevice corrosion, and fouling of the stainless steel bolting exposed to raw water in the Service Water system. In addition, microbiologically influenced corrosion is an additional aging mechanism in the Service Water system. Consistent with NUREG 1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage loss of material due to pitting and crevice corrosion, and fouling of the stainless steel piping components exposed to raw water in the Dewatering, Service Water, and

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Screen Wash systems and stainless steel tanks in the Dewatering system. In addition, microbiologically influenced corrosion is an additional aging mechanism in the Dewatering and Screen Wash systems. Fouling in the Service Water system is not applicable since the raw rater is potable water.
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 microbiologically influenced corrosion	Open-Cycle Cooling Water System	No	Components in the Boron Recovery and Waste Processing Liquid systems have been aligned to this line item based on material, environment and aging effect. Consistent with NUREG 1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage loss of material due to pitting, crevice, and microbiologically induced corrosion of the stainless steel piping components and stainless steel tanks exposed to raw water in the Boron Recovery and Waste Processing Liquid systems. In addition, fouling is an additional aging mechanism in the Boron Recovery and Waste Processing Liquid systems. The raw water environment associated with the Boron Recovery and Waste Processing Liquid systems is radioactive liquid waste and therefore, Open-Cycle Cooling Water System Program is not applicable. Consistent with NUREG 1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage loss of material due to pitting, crevice, and microbiologically induced corrosion of the copper alloy piping components exposed to raw water in the Waste Processing Liquid system. In addition, fouling and galvanic corrosion are additional aging mechanisms for this line item. The raw water environment associated with the Waste Processing Liquid system is radioactive liquid waste and therefore, Open-Cycle Cooling Water System Program is not applicable. Components in the Primary Structures were aligned to this line based on material, environment, and aging effect.

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Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Consistent with NUREG-1801. The Structures Monitoring Program, B.2.1.31, will be substituted for the Open Cycle Cooling Water System Program to manage loss of material due to pitting, crevice, and microbiologically induced corrosion of the stainless steel structural components exposed to Raw Water in the Primary Structures. There are no copper alloy piping components exposed to raw water to align with NUREG-1801 line VII.H2-11 in the Diesel Generator system. There is no stainless steel piping components exposed to raw water to align with NUREG-1801 line VII.H2-18 in the Diesel Generator system.
3.3.1-81	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	Open-Cycle Cooling Water System	No	Components in the Circulating Water system have been aligned to this line item due to material, environment, and aging effect. Consistent with NUREG 1801 with exceptions. The Open-Cycle Cooling Water System Program (with exceptions), B.2.1.11, will be used to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling of the copper alloy piping components exposed to raw water in the Service Water and Circulating Water systems. Components in the Chlorination, Dewatering, Plant Floor Drain, and Screen Wash systems have been aligned to this item number based on material, environment and aging effect. Consistent with NUREG 1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be substituted to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling of the copper alloy piping components exposed to raw water in the Chlorination, Dewatering, Plant Floor Drain, and Screen Wash system. In addition, galvanic corrosion is an additional aging mechanism in the Dewatering and Screen Wash systems.

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Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exceptions. The Open-Cycle Cooling Water System Program (with exceptions), B.2.1.11, will be used to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling of the copper alloy heat exchanger components exposed to raw water in the Diesel Generator system. In addition, galvanic corrosion is not applicable since heat exchanger components are not in contact with a more noble material.
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 with exceptions. The Open-Cycle Cooling Water System Program (with exceptions), B.2.1.11, will be used to manage reduction of heat transfer due to fouling of the copper alloy heat exchanger tubes exposed to raw water in the Diesel Generator system. Components in the Fire Protection system have been aligned to this item number based on material, environment and aging effect. Consistent with NUREG 1801. The Fire Water System Program, B.2.1.16, will be substituted to manage loss of heat transfer due to fouling of the stainless steel heat exchanger tubes exposed to raw water in the Fire Protection system.
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 Selective Leaching of Materials Program (with exceptions), B.2.1.21, will be used to manage loss of material due to selective leaching of the following Copper alloy >15% Zn components: *a)* Copper alloy >15% Zn piping components exposed to closed-cycle cooling water in the Containment Enclosure Air Handling, Control Building Air Handling, Diesel Generator, and Primary Component Cooling Water systems. *b)* Copper alloy >15% Zn piping components exposed to treated water in the Demineralized Water, Fuel Handling, and Hot Water Heating systems. *c)* Copper alloy >15% Zn heater coil exposed to treated water in the Hot Water Heating system. *d)* Copper alloy >15% Zn piping components exposed to raw water in the Dewatering, Fire Protection, Potable Water, Service

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Water, Screen Wash, and Waste Processing Liquid systems. *e)* Copper alloy >15 % Zn heat exchanger components exposed to closed-cycle cooling water are in the Control Building Air Handling System.
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 Selective Leaching of Materials Program (with exceptions), B.2.1.21, will be used to manage loss of material due to selective leaching of the following gray cast iron components: *a)* Gray cast iron piping components exposed to raw water in the Chlorination, Fire Protection, Plant Floor Drain, Roof Drains, and Screen Wash systems. *b)* Gray cast iron piping components exposed to closed cycle cooling water in the Containment Enclosure Air Handling, Control Building Air Handling, Diesel Generator, Primary Auxiliary Building Air Handling, Primary Component Cooling Water, and Waste Processing Liquid Drains systems. *c)* Gray cast iron piping components, heat exchanger components, and tanks exposed to treated water in the Hot Water Heating system. *d)* Gray cast iron piping components exposed to soil in the Fire Protection system. e) Gray cast iron heat exchanger components exposed to raw water in the Fire Protection System.
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	Consistent with NUREG-1801. The Structures Monitoring Program, B.2.1.31, will be used to manage loss of material due to general pitting and crevice corrosion of the steel new fuel storage rack support exposed to air indoor uncontrolled in Supports.
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	Not applicable to the Auxiliary Systems at Seabrook Station. The Boraflex racks are not credited for the neutron-absorbing capacity in the criticality analyses and therefore Boraflex will not be manage for reduction of neutron-absorbing.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in the Auxiliary Steam Condensate, Chemical and Volume Control, Hot Water Heating, and Service Water systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Boric Acid Corrosion Program, B.2.1.4, will be used to manage loss of material due to boric acid corrosion of the following aluminum and copper alloy >15% Zn components exposed to air with borated water leakage: *a)* Copper alloy >15% Zn piping components in the Auxiliary Steam Condensate, Chemical and Volume Control, Containment Enclosure Air Handling, Demineralized Water, Dewatering, Fire Protection, Fuel Handling, Hot Water Heating, Instrument Air, Miscellaneous Equipment, Primary Component Cooling Water, and Service Water systems. *b)* Copper alloy >15% Zn bolting in the Service Water system, *c)* Copper alloy >15% Zn heater coil in the Hot Water Heating system, *d)* Aluminum piping components in the Instrument Air and Miscellaneous Equipment systems. e) Copper alloy >15% Zn heat exchanger components in the Chemical and Volume Control System.
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 Boric Acid Corrosion Program, B.2.1.4, will be used to manage loss of material due to boric acid corrosion of the following steel components exposed to air with borated water leakage: *a)* Steel external surfaces exposed to air with borated water leakage in the Boron Recovery, Chemical and Volume Control, Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On Line Purge, Dewatering, Diesel Generator, Fire Protection, Fuel Handling, Fuel Storage Building Air Handling, Hot Water Heating, Instrument Air, Mechanical Seal Supply, Miscellaneous Equipment, Nitrogen Gas, Oil Collection for Reactor Coolant Pumps, Primary Auxiliary Building Air Handling, Primary Component Cooling Water, Reactor Make-Up Water, Release Recovery, Roof Drains, Sample, Service Water, Spent Fuel Pool Cooling, Waste Gas, Waste Processing

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Liquid, and Waste Processing Liquid Drains systems. *b)* Galvanized steel ducting components exposed to air with borated water leakage in the Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On Line Purge, Fuel Storage Building Air Handling, and Primary Auxiliary Building Air Handling systems. *c)* Steel ducting bolting exposed to air with borated water leakage in the Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Containment On-Line Purge, Fuel Storage Building Air Handling, and Primary Auxiliary Building Air Handling systems. d) Steel bolting exposed to air with borated water leakage in the Chemical and Volume Control, Containment Air Purge, Containment Enclosure Air Handling, Containment On Line Purge, Diesel Generator, Fire Protection, Fuel Handling, Hot Water Heating, Instrument Air, Mechanical Seal Supply, Miscellaneous Equipment, Nitrogen Gas, Primary Auxiliary Building Air Handling, Primary Component Cooling Water, Radiation Monitoring, Release Recovery, Roof Drains, Sample, Service Water, Spent Fuel Pool Cooling, Waste Gas, and Waste Processing Liquid Drains systems.
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	Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking of the stainless steel piping components exposed to treated borated water >60°C (>140°F) in the Chemical and Volume Control, Sample, and Valve Stem Leak-Off systems and stainless steel tanks in the Chemical and Volume Control system. In addition The Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking of the stainless steel fuel storage rack support exposed to treated borated water >60°C (>140°F) in Section 3.5, table 3.5.2.6, Supports.
3.3.1-91	Stainless steel and steel with stainless steel cladding piping, piping components, and piping elements	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Components in the Auxiliary Steam, Chemical and Volume Control System, Sample, Spent Fuel Pool Cooling, and Waste Processing Liquid Drains systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Water Chemistry Program,

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	exposed to treated borated water				B.2.1.2, will be used to manage loss of material due to pitting and crevice corrosion of the following stainless steel components exposed to treated borated water: *a)* Stainless steel piping components exposed to treated borated water in the Auxiliary Steam, Boron Recovery, Chemical and Volume Control, Nitrogen Gas, Reactor Make-Up Water, Release Recovery, Resin Sluicing, Sample, Spent Fuel Pool Cooling, Valve Stem Leak-Off, Waste Gas, and Waste Processing Liquid Drains systems, *b)* Stainless steel heat exchanger components exposed to treated borated water in the Chemical and Volume Control, Spent Fuel Pool Cooling, and Waste Processing Liquid Drains system, *c)* Stainless steel tanks exposed to treated borated water in the Chemical and Volume Control, Sample, Spent Fuel Pool Cooling, and Waste Processing Liquid Drains, and *d)* Stainless steel bolting exposed to treated borated water in the Spent Fuel Pool Cooling system.
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. The following galvanized components exposed to air-indoor uncontrolled have been aligned to this item number based on material, environment and aging effect: *a)* Galvanized steel piping components exposed to air-indoor uncontrolled in the Fire Protection system. *b)* Galvanized steel damper housing in the Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling, Control Building Air Handling, Diesel Generator, Emergency Feedwater Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, and Service Water Pump House Air Handling systems. *c)* Galvanized ducting closure bolting exposed to air-indoor uncontrolled in the Control Building Air Handling system. *d)* Galvanized drip pans exposed to air-indoor uncontrolled in the Demineralized Water system. *e)* Galvanized steel ducting in the Containment Air Handling, Containment Air Purge, Containment Enclosure Air Handling Containment On Line Purge, Control Building Air Handling, Diesel

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Generator, Emergency Feedwater Pump House Air Handling, Fuel Storage Building Air Handling, Primary Auxiliary Building Air Handling, and Service Water Pump House Air Handling systems. *f)* Galvanized steel Air Conditioning Housing in the Containment Enclosure Air Handling system. *g)* Galvanized Filter Housing in the Containment Enclosure Air Handling and Service Water Pump House Air Handling systems.
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. Glass piping elements exposed to air-indoor uncontrolled (external) are in the Chemical and Volume Control, Control Building Air Handling, Dewatering, Diesel Generator, Fire Protection, Fuel Handling, Hot Water Heating, Primary Component Cooling Water, Radiation Monitoring, Reactor Make-Up Water, Sample, and Spent Fuel Pool Cooling systems. Glass piping elements exposed to lubricating oil are in the Chemical and Volume Control, Diesel Generator, and Service Water systems. Glass piping elements exposed to treated borated water are in the Chemical and Volume Control and Spent Fuel Pool Cooling systems. Glass piping elements exposed to treated water are in the Chemical and Volume Control, Fuel Handling, Hot Water Heating, Radiation Monitoring, Reactor Make-Up Water, and Sample systems. Glass piping elements exposed to raw water are in the Dewatering, Fire Protection, and Service Water systems.
3.3.1-94	Stainless steel and nickel alloy piping, piping components, and piping elements exposed to air-indoor uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG- 1801. Stainless steel damper housings, stainless steel drip pans, stainless steel filter housing, stainless steel ducting closure bolting exposed to air-indoor uncontrolled (external) in the Containment Air Handling, Containment Enclosure Air Handling, Control

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	(external)				Building Air Handling, and Fuel Storage Building Air Handling systems, have been aligned to this item number based on material, environment and aging effect. The following stainless steel and nickel alloy components exposed to air-indoor uncontrolled (external) have been aligned to this item number based on material, environment and aging effect: *a)* Stainless steel piping components exposed to air-indoor uncontrolled (external) in the Auxiliary Boiler, Boron Recovery, Chemical and Volume Control, Chlorination, Containment Air Handling, Containment Enclosure Air Handling, Containment On-Line Purge, Control Building Air Handling, Demineralized Water, Dewatering, Diesel Generator, Fire Protection, Fuel Handling, Fuel Storage Building Air Handling, Hot Water Heating, Instrument Air, Leak Detection, Mechanical Seal Supply, Miscellaneous Equipment, Nitrogen Gas, Oil Collection for Reactor Coolant Pumps, Plant Floor Drain, Potable Water, Primary Component Cooling Water, Radiation Monitoring, Reactor Make-Up Water, Release Recovery, Resin Sluicing, Sample, Service Water, Spent Fuel Pool Cooling, Valve Stem Leak-Off, Vent Gas, Waste Gas, Waste Processing Liquid, and Waste Processing Liquid Drains systems, and *b)* Stainless steel heat exchanger components exposed to air-indoor uncontrolled (external) in the Chemical and Volume Control, Instrument Air , Mechanical Seal Supply, Radiation Monitoring, Sample Spent Fuel Pool Cooling, and Waste Processing Liquid Drains systems. *c)* Stainless steel tanks exposed to air-indoor uncontrolled (external) in the Boron Recovery, Chemical and Volume Control, Control Building Air Handling, Dewatering, Instrument Air, Mechanical Seal Supply, Oil Collection for Reactor Coolant Pumps, Reactor Make-Up Water, Sample, Spent Fuel Pool Cooling, Vent Gas, Waste Processing Liquid, and Waste Processing Liquid Drains systems. *d)* Stainless steel drip pans and stainless steel flame arrestors exposed to air-indoor uncontrolled (external) in the Oil Collection for Reactor Coolant Pumps system.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					e) Stainless steel damper housings exposed to air-indoor uncontrolled (external) are in the Containment Air Handling system, stainless steel drip pans exposed to air-indoor uncontrolled (external) are in the Containment Air Handling and Containment Enclosure Air Handling system, stainless steel filter housings exposed to air-indoor uncontrolled are in the Containment Air Handling, Containment Enclosure Air Handling, Control Building Air Handling, and Fuel Storage Air Handling systems, and stainless steel ducting closure bolting exposed to air-indoor uncontrolled (external) are in the Fuel Storage Building Air Handling system. *f)* Nickel alloy piping components in the Chemical and Volume Control, Chlorination, and Primary Component Cooling Water systems. Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation. Therefore, the following stainless steel components exposed to air-indoor uncontrolled (internal) have been aligned to this item number based on material, environment and aging effect: *a)* Stainless steel damper housings air-indoor uncontrolled (internal) in the Containment Air Handling, Containment Enclosure Air Handling, and Fuel Storage Building Air Handling systems. *b)* Stainless steel filter housings air-indoor uncontrolled (internal) in the Containment Air Handling system. *c)* Stainless steel piping components air-indoor uncontrolled (internal) in the Containment Air Handling, Containment Enclosure Air Handling, Containment On Line Purge, Control Building Air Handling, Dewatering, Diesel Generator, Fire Protection, Fuel Storage Building Air Handling, Leak Detection, Primary Component Cooling Water, and Radiation Monitoring systems.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. The following steel and aluminum components exposed to air-indoor controlled (external) have been aligned to this item number based on material, environment and aging effect: a) Steel damper housing in the Control Building Air Handling system. b) Steel drip pan in the Control Building Air Handling system. c) Steel filter housing in the Control Building Air Handling system. d) Steel piping components in the Control Building Air Handling system. e) Steel tank in the Control Building Air Handling system. f) Aluminum fan housing in the Control Building Air Handling system. Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-16 steel in an indoor controlled air (external) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation. Steel damper housing and steel piping components exposed to air-indoor controlled (internal) are in the Control Building Air Handling system.
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. The following steel and stainless steel components exposed to concrete have been aligned to this item number based on material, environment and aging effect:: *a)* Galvanized steel drip pans exposed to concrete in the Demineralized Water system. *b)* Galvanized damper housings exposed to concrete in the Containment Enclosure Air Handling system. *c)* l piping components exposed to concrete in the Plant Floor Drain system. d) Carbon steel and stainless steel piping exposed to concrete in the Waste Processing Liquid Drains system.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. The following steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas have been aligned to this item number based on material, environment and aging effect:: a) Steel piping components exposed to gas are contained in the Fire Protection, Nitrogen Gas, Switchyard, and Waste Gas systems b) Steel heat exchanger components are exposed to gas in the Chemical and Volume Control system. c) Steel compressor housing exposed to gas are contained in the Control Building Air Handling system. d) Stainless steel piping components exposed to gas are contained in the Chemical and Volume Control, Fire Protection, Nitrogen Gas, Switchyard, Vent Gas, and Waste Gas systems. e) Stainless steel heat exchanger components exposed to gas are contained in the Chemical and Volume Control system. f) Aluminum piping components exposed to gas are contained in the Switchyard system. g) Copper alloy piping components exposed to gas are contained in the Control Building Air Handling, Fire Protection, and Switchyard systems. h) Copper alloy heat exchanger components are exposed to gas in the Control Building Air Handling system.
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. *a)* Stainless steel piping components exposed to dried air are contained in the Diesel Generator and Instrument Air systems. *b)* Stainless steel tanks exposed to dried air are contained in the Instrument Air system. *c)* Steel piping components and steel tanks exposed to dried air are contained in the Diesel Generator and Instrument Air systems. *d)* Copper alloy piping components exposed to dried air are contained in the Diesel Generator and Instrument Air systems.
3.3.1-99	Stainless steel and copper alloy <15% Zn piping, piping components, and piping elements	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. Components in the Auxiliary Steam, Auxiliary Steam Condensate, Auxiliary Steam Heating, Feedwater, Main Steam, and Steam Generator Blowdown systems have been aligned to this line item based on material, environment, and aging effect.

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	exposed to air with borated water leakage				The following stainless steel and copper alloy <15% Zn components exposed to air with borated water leakage have been aligned to this item number based on material, environment and aging effect:: *a)* Stainless steel piping components exposed to air with borated water leakage in the Auxiliary Steam, Auxiliary Steam Condensate, Recovery, Chemical and Volume Control, Containment Air Handling, Containment Enclosure Air Handling, Containment On-Line Purge, Demineralized Water, Dewatering, Diesel Generator, Feedwater, Fire Protection, Fuel Handling, Fuel Storage Building Air Handling, Hot Water Heating, Instrument Air, Leak Detection, Main Steam, Mechanical Seal Supply, Miscellaneous Equipment, Nitrogen Gas, Oil Collection for Reactor Coolant Pumps, Primary Component Cooling Water, Radiation Monitoring, Reactor Make-Up Water, Release Recovery, Resin Sluicing, Sample, Service Water, Spent Fuel Pool Cooling, Steam Generator Blowdown, Valve Stem Leak-Off, Vent Gas, Waste Gas, Waste Processing Liquid, and Waste Processing Liquid Drains systems. *b)* Stainless steel drip pans and stainless steel flame arrestors exposed to air with borated water leakage in the Oil Collection for Reactor Coolant Pump system. *c)* Stainless steel heat exchanger components exposed to air with borated water leakage in the Auxiliary Steam Heating, Chemical and Volume Control, Mechanical Seal Supply, Radiation Monitoring, Sample, Spent Fuel Pool Cooling, Waste Processing Liquid Drains, and Steam Generator Blowdown systems. *d)* Stainless steel tanks exposed to air with borated water leakage in the Boron Recovery, Chemical and Volume Control, Dewatering, Mechanical Seal Supply, Oil Collection for Reactor Coolant Pumps, Reactor Make-Up Water, Sample, Spent Fuel Pool Cooling, Vent Gas, Waste Processing Liquid, and Waste Processing Liquid Drains systems *e)* Stainless steel ducting closure bolting and stainless steel filter housings exposed to air with borated water leakage in the Fuel Storage Building Air Handling system,

Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					f) Stainless steel damper housing and stainless steel filter housing exposed to air with borated water leakage in the Containment Air Handling system. *g)* Copper alloy piping components exposed to air with borated water leakage in the Auxiliary Steam Condensate, , Chemical and Volume Control, Containment Air Handling, Containment Enclosure Air Handling, Dewatering, Fire Protection, , Fuel Storage Building Air Handling, Instrument Air, Primary Component Cooling Water, and Service Water systems. *h)* Copper alloy heater coil exposed to air with borated water leakage in the Hot Water Heating system. *i)* Copper alloy heat exchanger components exposed to air with borated water leakage in the Diesel Generator system.

Table 3.3.2-1

AUXILIARY BOILER

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	Bolting Integrity Program	VII.I-1 (AP-28)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Instrumentation Element	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Instrumentation Element	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B

Table 3.3.2-1

AUXILIARY BOILER

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Filter Housing	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Filter Housing	Pressure Boundary	Copper Alloy >15% Zn	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-3 (AP-44)	3.3.1-32	B A
Filter Housing	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Filter Housing	Pressure Boundary	Gray Cast Iron	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A
Flame Arrestor	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Flame Arrestor	Pressure Boundary	Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-6 (SP-59)	3.4.1-30	B
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A

Table 3.3.2-1

AUXILIARY BOILER

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Copper Alloy	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-3 (AP-44)	3.3.1-32	B A
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Piping and Fittings	Pressure Boundary	Steel	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.H1-9 (A-01)	3.3.1-19	B
Piping and Fittings	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A
Pump Casing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A
Tank	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	Aboveground Steel Tanks Program	VII.H1-11 (A-95)	3.3.1-40	A

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AUXILIARY BOILER

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A
Thermowell	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Pressure Boundary	Stainless Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-6 (AP-54)	3.3.1-32	B A
Valve Body	Pressure Boundary	Aluminum	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Pressure Boundary	Aluminum	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	None	None	G
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-3 (AP-44)	3.3.1-32	B A
Valve Body	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Pressure Boundary	Gray Cast Iron	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A

Table 3.3.2-1

AUXILIARY BOILER

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Valve Body	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-2

BORON RECOVERY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Heater Housing	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heater Housing	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heater Housing	Leakage Boundary (Spatial)	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	A A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-2

BORON RECOVERY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 1
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 1
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 1

Table 3.3.2-2

BORON RECOVERY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	CASS	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 1
Valve Body	Leakage Boundary (Spatial)	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 1
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with the Boron Recovery System. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Loss of Preload	Bolting Integrity Program	IV.C2-8 (R-12)	3.1.1-52	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	Air With Reactor Coolant Leakage (External)	Cracking	Bolting Integrity Program	IV.C2-7 (R-11)	3.1.1-52	A
Bolting (Class 1)	Pressure Boundary	Stainless Steel	System Temperature up to 340°C (644°F)	Cumulative Fatigue Damage	TLAA	IV.C2-10 (R-18)	3.1.1-7	A
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Housing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A
Filter Housing	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A
Filter Housing	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	VII.E1-18 (A-34)	3.3.1-2	A
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Filter Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Filter Housing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-19 (AP-30)	3.3.1-14	B A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F1-7 (A-73)	3.3.1-11	E, 4

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Hose	Pressure Boundary	Elastomer	Lubricating Oil (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Treated Borated Water (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.A3-1 (A-15)	3.3.1-12	E, 5
Flexible Hose	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	VII.J-14 (AP-16)	3.3.1-94	A
Flexible Hose	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 1
Flexible Hose	Pressure Boundary	Nickel Alloy	Gas (Internal)	None	None	None	None	G, 2
Flexible Hose	Pressure Boundary	Nickel Alloy	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Flexible Hose	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-15 (AP-59)	3.3.1-33	B A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Heat Exchanger Components (CS-E-2 Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-2 Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-2 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-2 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-2 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program	VII.E1-5 (A-84)	3.3.1-8	E, 6
Heat Exchanger Components (CS-E-2 Shell)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-2 Shell)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-2 Shell)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-2 Shell)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-2 Shell)	Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program	VII.E1-5 (A-84)	3.3.1-8	E, 6
Heat Exchanger Components (CS-E-2 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-2 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-2 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (External)	Cracking	Water Chemistry Program	VII.E1-5 (A-84)	3.3.1-8	E, 6
Heat Exchanger Components (CS-E-2 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-2 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-2 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program	VII.E1-5 (A-84)	3.3.1-8	E, 6
Heat Exchanger Components (CS-E-2 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-2 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-2 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (External)	Cracking	Water Chemistry Program	VII.E1-5 (A-84)	3.3.1-8	E, 6
Heat Exchanger Components (CS-E-2 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-2 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-2 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program	VII.E1-5 (A-84)	3.3.1-8	E, 6
Heat Exchanger Components (CS-E-3 Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-3 Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-3 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-3 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-3 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program 0ne-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-3 Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-3 Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-E-3 Shell,)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.E1-6 (A-63)	3.3.1-48	B
Heat Exchanger Components (CS-E-3 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B
Heat Exchanger Components (CS-E-3 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.C2-3 (AP-63)	3.3.1-52	B
Heat Exchanger Components (CS-E-3 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-3 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-3 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-3 Tube Sheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-3 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-3 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-3 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-4 Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-4 Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-4 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-4 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-4 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-4 Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CS-E-4 Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-E-4 Shell)	Pressure Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.E1-6 (A-63)	3.3.1-48	B
Heat Exchanger Components (CS-E-4 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B
Heat Exchanger Components (CS-E-4 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.C2-3 (AP-63)	3.3.1-52	B
Heat Exchanger Components (CS-E-4 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-4 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-4 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7

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CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-4 Tube Sheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B
Heat Exchanger Components (CS-E-4 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-4 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-4 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-5A and 5B Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-5A and 5B Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-5A and 5B Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-5A and 5B Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C

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Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-5A and 5B Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-5A and 5B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CS-E-5A and 5B Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-E-5A and 5B Shell)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.E1-6 (A-63)	3.3.1-48	B
Heat Exchanger Components (CS-E-5A and 5B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B
Heat Exchanger Components (CS-E-5A and 5B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.C2-3 (AP-63)	3.3.1-52	B
Heat Exchanger Components (CS-E-5A and 5B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-5A and 5B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C

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CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-5A and 5B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-5A and 5B Tube Sheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B
Heat Exchanger Components (CS-E-5A and 5B Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-5A and 5B Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-5A and 5B Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-6 Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-6 Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-6 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A

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CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-6 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-6 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-6 Shell)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-6 Shell)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-6 Shell)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-6 Shell)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-6 Shell)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-6 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A

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CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-6 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-6 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (External)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-6 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-6 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-6 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-6 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-6 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-6 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (External)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7

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Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-6 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-6 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-6 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-7 Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-7 Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-7 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-7 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-7 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7

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CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-7 Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CS-E-7 Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-E-7 Shell)	Pressure Boundary	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	C
Heat Exchanger Components (CS-E-7 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Gas (External)	None	None	VII.J-19 (AP-22)	3.3.1-97	C
Heat Exchanger Components (CS-E-7 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-7 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-7 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-7 Tube Sheet)	Pressure Boundary	Stainless Steel	Gas (External)	None	None	VII.J-19 (AP-22)	3.3.1-97	C
Heat Exchanger Components (CS-E-7 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A

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Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-7 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-7 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-8 Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-8 Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-8 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-8 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-8 Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-8 Shell)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C

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Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-8 Shell)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-8 Shell)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-8 Shell)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-8 Shell)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-8 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-8 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-8 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (External)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-8 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A

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Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-8 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-8 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-8 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-8 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-8 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (External)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-8 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-8 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-8 Tube Sheet)	Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7

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Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-63 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-63 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-63 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-63 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-63 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-63 Shell)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CS-E-63 Shell)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-E-63 Shell)	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.E1-6 (A-63)	3.3.1-48	B

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-64 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-64 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-64 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-64 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-64 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-64 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-64 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-64 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-64 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-18)	3.3.1-91	C
Heat Exchanger Components (CS-E-64 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-65 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-65 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-65 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-65 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-18)	3.3.1-91	C
Heat Exchanger Components (CS-E-65 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-65 Shell)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-65 Shell)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-E-65 Shell)	Leakage Boundary (Spatial)	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	C C
Heat Exchanger Components (CS-E-138 Channel Head)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CS-E-138 Channel Head)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CE-E-138 Channel Head)	Leakage Boundary (Spatial)	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	C C
Heat Exchanger Components (CS-E-139 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-139 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-139 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	V.D1-4 (E-19)	3.2.1-28	B

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-139 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-E-139 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-E-139 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-4 (A-100)	3.3.1-2	A
Heat Exchanger Components (CS-E-139 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (CS-E-139 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-9 (A-69)	3.3.1-7	E, 7
Heat Exchanger Components (CS-E-166 Channel Head)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CS-E-166 Channel Head)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-E-166 Channel Head)	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.E1-6 (A-63)	3.3.1-48	B
Heat Exchanger Components (CS-E-166 Shell)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CS-E-166 Shell)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-E-166 Shell)	Leakage Boundary (Spatial)	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	C
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Channel Head)	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Channel Head)	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Channel Head)	Pressure Boundary	CASS	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	D
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Shell)	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Shell)	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Shell)	Pressure Boundary	CASS	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-15 (AP-59)	3.3.1-33	D C

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	D C
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-8 (EP-47)	3.2.1-9	B A
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.E1-2 (AP-34)	3.3.1-51	B
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.C2-2 (AP-80)	3.3.1-52	B
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Tube Sheet)	Pressure Boundary	CASS	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-15 (AP-59)	3.3.1-33	D C
Heat Exchanger Components (CS-P-2A and 2B Pump Oil Cooler Tube Sheet)	Pressure Boundary	CASS	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	D
Heat Exchanger Components (CS-P-128 Fluid Drive Cooler Channel Head)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-P-128 Fluid Drive Cooler Channel Head)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-P-128 Fluid Drive Cooler Channel Head)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.E1-6 (A-63)	3.3.1-48	B
Heat Exchanger Components (CS-P-128 Fluid Drive Cooler Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CS-P-128 Fluid Drive Cooler Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-P-128 Fluid Drive Cooler Shell)	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-5 (AP-39)	3.3.1-21	B A
Heat Exchanger Components (CS-P-128 Fluid Drive Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	D C
Heat Exchanger Components (CS-P-128 Fluid Drive Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-8 (EP-47)	3.2.1-9	B A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-P-128 Fluid Drive Cooler Tube Sheet)	Pressure Boundary	Copper Alloy	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	D C
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Channel Head)	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Channel Head)	Pressure Boundary	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Channel Head)	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-5 (AP-39)	3.3.1-21	B A
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Shell)	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	C
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Shell)	Pressure Boundary	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	C
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Shell)	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	D C

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	D C
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-8 (EP-47)	3.2.1-9	B A
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	D C
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Lubricating Oil (Internal)	Reduction of Heat Transfer	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-8 (EP-47)	3.2.1-9	B A
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Tube Sheet)	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	D C
Heat Exchanger Components (CS-P-128 Pump Oil Cooler Tube Sheet)	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	D C
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	B A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Program	V.D1-14 (E-24)	3.2.1-12	E, 5
Piping And Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping And Fittings	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Piping And Fittings	Pressure Boundary	Copper Alloy	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-12 (AP-47)	3.3.1-26	B A
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping And Fittings	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Piping And Fittings	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-15 (AP-59)	3.3.1-33	B A
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	VII.E1-18	3.3.1-2	A
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Piping And Fittings	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping And Fittings	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-19 (AP-30)	3.3.1-14	B A
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A
Piping And Fittings (Class 1< 4 Inches)	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Piping And Fittings (Class 1< 4 Inches)	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Piping And Fittings (Class 1< 4 Inches)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program One-Time Inspection of ASME Class 1 Small Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A A B
Piping and Fittings (Class 1 <4 Inches)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping And Fittings (Class 1< 4 Inches)	Pressure Boundary Throttle	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 3
Piping Element	Leakage Boundary (Spatial)	Glass	Lubricating Oil (Internal)	None	None	VII.J-10 (AP-15)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Borated Water (Internal)	None	None	VII.J-12 (AP-52)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Water (Internal)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
Pump Casing	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Pressure Boundary	CASS	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Pump Casing	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	VII.E1-18	3.3.1-2	A
Pump Casing	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Pressure Boundary	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Pump Casing	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-19 (AP-30)	3.3.1-14	B A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A
Pump Casing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	VII.E1-18	3.3.1-2	A
Pump Casing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Pump Casing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-19 (AP-30)	3.3.1-14	B A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing (High Head Centrifugal Charging Pump)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing (High Head Centrifugal Charging Pump)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing (High Head Centrifugal Charging Pump)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A
Pump Casing (High Head Centrifugal Charging Pump)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Pump Casing (High Head Centrifugal Charging Pump)	Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VII.E1-7 (A-76)	3.3.1-9	E, 7
Tank	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Tank	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Tank	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-27 (A-82)	3.3.1-16	B A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Thermowell	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-15 (AP-59)	3.3.1-33	B A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140°F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	CASS	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Valve Body	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-15 (AP-59)	3.3.1-33	B A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E1-16 (A-57)	3.3.1-2	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	VII.E1-18	3.3.1-2	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.E1-1 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B
Valve Body	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.E1-19 (AP-30)	3.3.1-14	B A
Valve Body	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.3.2-3

CHEMICAL AND VOLUME CONTROL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection Subsections IWB IWC and IWD Program Water Chemistry Program	IV.C2-5 (R-09)	3.1.1-68	A A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C2-25 (R-223)	3.1.1-8	A
Valve Body (Class 1)	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry Program	IV.C2-15 (RP-23)	3.1.1-83	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	NUREG-1801 does not include air with borated water leakage environment for nickel alloy components. Similar to V.F-13 for stainless steel, there are no aging effects for nickel alloy in air with borated water leakage. Additionally, the American Welding Society (AWS) “Welding Handbook,” (Seventh Edition, Volume 4, 1982, Library of Congress) identifies that nickel chromium alloy materials that are alloyed with iron, molybdenum, tungsten, cobalt or copper in various combinations have improved corrosion resistance.
2	NUREG-1801 does not include gas environment for nickel alloy components. Similar to VII.J-19 for stainless steel in Gas environment, there are no aging effects for nickel alloy in gas environment.

3	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.
4	NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.
5	NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.
6	NUREG-1801 specifies the Water Chemistry and a plant-specific program for this line item. The Water Chemistry and continuous temperature monitoring is used to manage the aging effect(s) applicable to this component type, material, and environment combination. In addition, the one-time inspection of another non-regenerative heat exchanger with stainless steel components in the same environment will verify that this aging effect is not occurring.
7	NUREG-1801 specifies Water Chemistry and a plant-specific program for this line item. The Water Chemistry and One-Time Inspection Programs are used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-4

CHLORINATION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.D-1 (A-103)	3.3.1-44	A
Filter Housing	Leakage Boundary (Spatial)	Polymer (PVC)	Condensation (External)	None	None	None	None	F, 1
Filter Housing	Leakage Boundary (Spatial)	Polymer (PVC)	Raw Water (Internal)	None	None	None	None	F, 1
Instrumentation Element	Leakage Boundary (Spatial)	Polymer (PVDF)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 1
Instrumentation Element	Leakage Boundary (Spatial)	Polymer (PVDF)	Raw Water (Internal)	None	None	None	None	F, 1
Piping and Fittings	Leakage Boundary (Spatial)	Fiberglass	Condensation (External)	None	None	None	None	F, 5

Table 3.3.2-4

CHLORINATION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Fiberglass	Raw Water (Internal)	None	None	None	None	F, 5
Piping and Fittings	Leakage Boundary (Spatial)	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	VII.J-14 (AP-16)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Nickel Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-13 (AP-53)	3.3.1-78	E, 2
Piping and Fittings	Leakage Boundary (Spatial)	Polymer (PVC)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 1
Piping and Fittings	Leakage Boundary (Spatial)	Polymer (PVC)	Raw Water (Internal)	None	None	None	None	F, 1
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 3
Pump Casing	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-4

CHLORINATION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 3
Valve Body	Leakage Boundary (Spatial)	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F4-12 (A-46)	3.3.1-25	E, 4
Valve Body	Leakage Boundary (Spatial)	Copper Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-9 (A-44)	3.3.1-81	E, 2
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 3
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C1-11 (A-51)	3.3.1-85	B
Valve Body	Leakage Boundary (Spatial)	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	VII.J-14 (AP-16)	3.3.1-94	A

Table 3.3.2-4

CHLORINATION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Nickel Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-13 (AP-53)	3.3.1-78	E, 2
Valve Body	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 3

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Unlike metals, Polymers do not display corrosion rates. Rather than depending on an oxide layer for protection, they depend on chemical resistance to the environment to which they are exposed. The plastic is either completely resistant to the environment or it deteriorates. Therefore, acceptability for the use of Polymers within a given environment is a design driven criterion. Once the appropriate material is chosen, the system will have no aging effects. This is consistent with Plant operating experience.

2 NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with the Chlorination System. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

3 NUREG-1801 specifies the Fire Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with the Chlorination system. Therefore, the Fire Water System Program is not applicable to this environment.

4 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

5 Fiberglass components in Condensation environment (external) or Raw Water environment (internal) are not exposed to high levels of ultraviolet radiation, high temperatures, or ozone, and therefore have no aging effects that require aging management. This is consistent with plant operating experience.

Table 3.3.2-5

CONTAINMENT AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Air Conditioner Housing (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Housing)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2 (A-10)	3.3.1-56	B
Air Conditioner Housing (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Housing)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Air Conditioner Housing (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Housing)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Damper Housing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C

Table 3.3.2-5

CONTAINMENT AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Damper Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 1
Drip Pan	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Drip Pan	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F3-1 (A-09)	3.3.1-27	E, 2
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting Closure Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-4 (A-105)	3.3.1-55	B
Ducting Closure Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

Table 3.3.2-5

CONTAINMENT AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2 (A-10)	3.3.1-56	B
Fan Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Filter Housing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 1
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2 (A-10)	3.3.1-56	B
Filter Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

Table 3.3.2-5

CONTAINMENT AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F3-7 (A-17)	3.3.1-11	E, 3
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-5 (A-73)	3.3.1-34	E, 3
Flexible Connector	Pressure Boundary	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary	Elastomer	Air With Borated Water Leakage (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F3-7 (A-17)	3.3.1-11	E, 2
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F3-6 (A-18)	3.3.1-34	E, 2

Table 3.3.2-5

CONTAINMENT AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Cooling Coil Header)	Pressure Boundary	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-16 (A-46)	3.3.1-25	E, 3
Heat Exchanger Components (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Cooling Coil Header)	Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F3-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-16 (A-46)	3.3.1-25	E, 3
Heat Exchanger Components (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Condensation (External)	Reduction of Heat Transfer	External Surfaces Monitoring Program	None	None	G
Heat Exchanger Components (1-CAH-AC-1A, 1B,1C, 1D, 1E, & 1F Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F3-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.F3-12 (AP-80)	3.3.1-52	B

Table 3.3.2-5

CONTAINMENT AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Cooling Coil Fins)	Heat Transfer	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-16 (A-46)	3.3.1-25	E, 3
Heat Exchanger Components (1-CAH-AC-1A, 1B, 1C, 1D, 1E, & 1F Cooling Coil Fins)	Heat Transfer	Copper Alloy	Condensation (External)	Reduction of Heat Transfer	External Surfaces Monitoring Program	None	None	G
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 1

Table 3.3.2-5

CONTAINMENT AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F3-1 (A-09)	3.3.1-27	E, 2
Thermowell	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2 (A-10)	3.3.1-56	B

Table 3.3.2-5

CONTAINMENT AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Thermowell	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 1
Valve Body	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

2 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-6

CONTAINMENT AIR PURGE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Damper Housing	Fire Barrier	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Fire Barrier	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Damper Housing	Fire Barrier	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2 (A-10)	3.3.1-56	B
Damper Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D

Table 3.3.2-6

CONTAINMENT AIR PURGE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting Closure Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-4	3.3.1-55	B
Ducting Closure Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F3-7 (A-17)	3.3.1-11	E, 1

Table 3.3.2-6

CONTAINMENT AIR PURGE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-5 (A-73)	3.3.1-34	E, 1
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air With Borated Water Leakage (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F3-7 (A-17)	3.3.1-11	E, 2
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E, 2

Table 3.3.2-6

CONTAINMENT AIR PURGE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

2 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Air Conditioner Housing (EAH-AC-2A & 2B Housing)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Air Conditioner Housing (EAH-AC-2A & 2B Housing)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Air Conditioner Housing (EAH-AC-2A & 2B Housing)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Air Conditioner Housing (EAH-AC-83A, 83B, 84A, 84B, 85A & 85B Housing)	Leakage Boundary (Spatial)	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Air Conditioner Housing (EAH-AC-83A, 83B, 84A, 84B, 85A & 85B Housing)	Leakage Boundary (Spatial)	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Air Conditioner Housing (EAH-AC-83A, 83B, 84A, 84B, 85A & 85B Housing)	Leakage Boundary (Spatial)	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Damper Housing	Fire Barrier	Galvanized Steel	Concrete (External)	None	None	VII.J-21 (AP-3)	3.3.1-96	C
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Damper Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Drip Pan	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Drip Pan	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-1 (A-09)	3.3.1-27	E, 2
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Ducting	Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Ducting	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Ducting Closure Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-4 (A-105)	3.3.1-55	B
Ducting Closure Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	C
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Fan Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Filter Housing	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Filter Housing	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Filter Housing	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F2-13 (AP-12)	3.3.1-51	B
Filter Housing	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.F2-15 (AP-43)	3.3.1-84	B

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Filter Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 1
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Filter Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F2-7 (A-17)	3.3.1-11	E, 3

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-5 (A-73)	3.3.1-34	E, 3
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air With Borated Water Leakage (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-7 (A-17)	3.3.1-11	E, 2
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-6 (A-18)	3.3.1-34	E, 2
Heat Exchanger Components (EAH-AC-2A & 2B Cooling Coil Header)	Pressure Boundary	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-14 (A-46)	3.3.1-25	E, 3

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (EAH-AC-2A & 2B Cooling Coil Header)	Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (EAH-AC-2A & 2B Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-14 (A-46)	3.3.1-25	E, 3
Heat Exchanger Components (EAH-AC-2A & 2B Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Condensation (External)	Reduction of Heat Transfer	External Surfaces Monitoring Program	None	None	G
Heat Exchanger Components (EAH-AC-2A & 2B Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (EAH-AC-2A & 2B Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.F2-10 (AP-80)	3.3.1-52	B
Heat Exchanger Components (EAH-AC-2A & 2B Cooling Coil Fins)	Heat Transfer	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-14 (A-46)	3.3.1-25	E, 3
Heat Exchanger Components (EAH-AC-2A & 2B Cooling Coil Fins)	Heat Transfer	Copper Alloy	Condensation (External)	Reduction of Heat Transfer	External Surfaces Monitoring Program	None	None	G
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 1
Piping and Fittings	Leakage Boundary (Spatial)	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F2-13 (AP-12)	3.3.1-51	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.D-4 (AP-81)	3.3.1-54	E, 4
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F2-18 (A-25)	3.3.1-47	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.F3-18 (A-50)	3.3.1-85	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 1
Valve Body	Leakage Boundary (Spatial)	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F2-13 (AP-12)	3.3.1-51	B
Valve Body	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-7

CONTAINMENT ENCLOSURE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

2 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

4 NUREG-1801 specifies the Compressed Air Monitoring Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The component that is aligned with this line item is associated with the Containment Enclosure Air Handling System and therefore, the Compressed Air Monitoring Program is not applicable.

Table 3.3.2-8

CONTAINMENT ONLINE PURGE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Damper Housing	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2 (A-10)	3.3.1-56	B
Damper Housing	Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Damper Housing	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Ducting	Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Structural Integrity (Attached)	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Ducting	Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C

Table 3.3.2-8

CONTAINMENT ONLINE PURGE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Ducting Closure Bolting	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-4 (A-105)	3.3.1-55	B
Ducting Closure Bolting	Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Flexible Connector	Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F3-7 (A-17)	3.3.1-11	E, 2
Flexible Connector	Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-5 (A-73)	3.3.1-34	E, 2
Flexible Connector	Structural Integrity (Attached)	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Structural Integrity (Attached)	Elastomer	Air With Borated Water Leakage (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F3-7 (A-17)	3.3.1-11	E, 3
Flexible Connector	Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F3-6 (A-18)	3.3.1-34	E, 3
Piping and Fittings	Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-8

CONTAINMENT ONLINE PURGE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2 (A-10)	3.3.1-56	B
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Valve Body	Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-8

CONTAINMENT ONLINE PURGE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2 (A-10)	3.3.1-56	B
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.
2	NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Air Conditioner Housing (CBA-AC-3A, 3B and 78)	Leakage Boundary (Spatial) Pressure Boundary	Galvanized Steel	Air-Indoor Controlled (External)	None	None	V.F-1 (EP-14)	3.2.1-51	A
Air Conditioner Housing (CBA-AC-3A, 3B and 78)	Leakage Boundary (Spatial) Pressure Boundary	Galvanized Steel	Air-Indoor Controlled (Internal)	None	None	V.F-1 (EP-14)	3.2.1-51	A, 6
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Compressor Housing (CBA-E-230A &B Chiller Unit Compressor)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2 (A-10)	3.3.1-56	B
Compressor Housing (CBA-E-230A&B Chiller Unit Compressor)	Pressure Boundary	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	C

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Damper Housing	Fire Barrier Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Controlled (External)	None	None	V.F-1 (EP-14)	3.2.1-51	A
Damper Housing	Fire Barrier Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Controlled (Internal)	None	None	V.F-1 (EP-14)	3.2.1-51	A, 6
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Fire Barrier Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Galvanized Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Damper Housing	Pressure Boundary	Steel	Air-Indoor Controlled (External)	None	None	VII.J-20 (AP-2)	3.3.1-95	C
Damper Housing	Pressure Boundary	Steel	Air-Indoor Controlled (Internal)	None	None	VII.J-20 (AP-2)	3.3.1-95	C, 5
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Drip Pan	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Controlled (External)	None	None	VII.J-20 (AP-2)	3.3.1-95	C
Drip Pan	Leakage Boundary (Spatial) Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F1-3 (A-08)	3.3.1-72	B
Dryer Housing	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Dryer Housing	Pressure Boundary	Copper Alloy >15% Zn	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Controlled (External)	None	None	V.F-1 (EP-14)	3.2.1-51	A

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Controlled (Internal)	None	None	V.F-1 (EP-14)	3.2.1-51	A, 6
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting Closure Bolting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Fan Housing	Pressure Boundary	Aluminum	Air-Indoor Controlled (External)	None	None	VII.J-1 (AP-36)	3.3.1-95	C
Fan Housing	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	C
Fan Housing	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (Internal)	None	None	V.F-2 (EP-3)	3.2.1-50	C
Fan Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Controlled (External)	None	None	V.F-1 (EP-14)	3.2.1-51	A

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Fan Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Controlled (Internal)	None	None	V.F-1 (EP-14)	3.2.1-51	A, 6
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2 (A-10)	3.3.1-56	B
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Fan Housing	Pressure Boundary	Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-6 (SP-59)	3.4.1-30	D
Filter Element	Filter	Stainless Steel	Air-Outdoor (Internal/External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Filter Housing	Pressure Boundary	Galvanized Steel	Air - Indoor Controlled (External)	None	None	V.F-1 (EP-14)	3.2.1-51	A
Filter Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Controlled (Internal)	None	None	V.F-1 (EP-14)	3.2.1-51	A, 6
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 1

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Steel	Air-Indoor Controlled (External)	None	None	VII.J-20 (AP-2)	3.3.1-95	C
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2 (A-10)	3.3.1-56	B
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Filter Housing	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-20 (A-25)	3.3.1-47	B
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Controlled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Controlled (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Controlled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Controlled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F1-7 (A-17)	3.3.1-11	E, 8
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-5 (A-73)	3.3.1-34	E, 8
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F1-7 (A-17)	3.3.1-11	E, 9
Flexible Connector	Pressure Boundary Structural Integrity (Attached)	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F1-6 (A-18)	3.3.1-34	E, 9
Flexible Hose	Pressure Boundary	Copper Alloy > 15% ZN	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Pressure Boundary	Copper Alloy > 15% ZN	Gas(Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
Flexible Hose	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15	3.3.1-94	A
Flexible Hose	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Heat Exchanger Components (CBA-E-228A & B Cooling Coil Header)	Pressure Boundary	Copper Alloy >15% Zn	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-16 (A-46)	3.3.1-25	E, 8
Heat Exchanger Components (CBA-E-228A & B Cooling Coil Header)	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (CBA-E-228A & B Cooling Coil Header)	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.F1-17 (AP-43)	3.3.1-84	D
Heat Exchanger Components (CBA-E-228A & B Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-16 (A-46)	3.3.1-25	E, 8
Heat Exchanger Components (CBA-E-228A & B Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-8 (AP-34)	3.3.1-51	B

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CBA-E-228A & B Cooling Coil)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.F1-12 (AP-80)	3.3.1-52	B
Heat Exchanger Components (CBA-AC-228A & B Fins)	Heat Transfer	Aluminum	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-14 (AP-74)	3.3.1-27	E, 8
Heat Exchanger Components (CBA-AC-228A & B Fins)	Heat Transfer	Aluminum	Condensation (External)	Reduction of Heat Transfer / Fouling	External Surfaces Monitoring Program	None	None	F
Heat Exchanger Components (CBA-E-229A & B Cooling Coil Header)	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-16 (A-46)	3.3.1-25	E, 8
Heat Exchanger Components (CBA-E-229A & B Cooling Coil Header)	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (CBA-E-229A & B Cooling Coil Header)	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.F1-17 (AP-43)	3.3.1-84	D
Heat Exchanger Components (CBA-E-229A & B Cooling Coil)	Leakage Boundary (Spatial)	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-16 (A-46)	3.3.1-25	E, 8
Heat Exchanger Components (CBA-E-229A & B Cooling Coil)	Leakage Boundary (Spatial)	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-8 (AP-34)	3.3.1-51	B

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Condenser Fins)	Heat Transfer	Aluminum	Air Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	C
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Condenser Fins)	Heat Transfer	Aluminum	Air Indoor Uncontrolled (External)	Reduction of Heat Transfer	External Surfaces Monitoring Program	None	None	F
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Condenser Header)	Heat Transfer Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	C
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Condenser Header)	Heat Transfer Pressure Boundary	Copper Alloy	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	C
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Condenser Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	C
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Condenser Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	C

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Evaporator Shell)	Heat Transfer Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	C
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Evaporator Shell)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Evaporator Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Evaporator Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.F1-12 (AP-80)	3.3.1-52	B
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Evaporator Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	C
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Evaporator Tubesheet)	Pressure Boundary	Copper Alloy	Air – Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	C

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CBA-E-230A & B Chiller Unit Evaporator Tubesheet)	Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-8 (AP-34)	3.3.1-51	B
Heater Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2 (A-10)	3.3.1-56	B
Heater Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-15 (AP-12)	3.3.1-51	B
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.F1-17 (AP-43)	3.3.1-84	B
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Controlled (External)	None	None	None	None	G, 10
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air-Indoor Controlled (External)	None	None	None	None	G, 11
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping And Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 7
Piping And Fittings	Leakage Boundary (Spatial)	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-15 (AP-12)	3.3.1-51	B
Piping And Fittings	Leakage Boundary (Spatial)	Copper Alloy	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F1-16 (A-46)	3.3.1-25	E, 4, 8
Piping And Fittings	Pressure Boundary	Copper Alloy	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping And Fittings	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2 (A-10)	3.3.1-56	B
Piping And Fittings	Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-20 (A-25)	3.3.1-47	B
Piping And Fittings	Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.F3-18 (A-50)	3.3.1-85	B
Piping And Fittings	Leakage Boundary (Spatial)	Polymer (PVC)	Air-Indoor Controlled (External)	None	None	None	None	F, 2
Piping And Fittings	Leakage Boundary (Spatial)	Polymer (PVC)	Condensation (Internal)	None	None	None	None	F, 2
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Controlled (External)	None	None	None	None	G, 10
Piping And Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping And Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Piping And Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping And Fittings	Pressure Boundary	Stainless Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Piping And Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Controlled (External)	None	None	VII.J-20 (AP-2)	3.3.1-95	A
Piping And Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Controlled (Internal)	None	None	VII.J-20 (AP-2)	3.3.1-95	A, 5
Piping And Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2 (A-10)	3.3.1-56	B
Piping And Fittings	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Piping And Fittings	Pressure Boundary	Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-6 (SP-59)	3.4.1-30	B

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping And Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-20 (A-25)	3.3.1-47	B
Piping And Fittings	Pressure Boundary	Steel	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.C1-18 (A-01)	3.3.1-19	B
Piping Element	Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Pressure Boundary	Glass	Closed Cycle Cooling Water (Internal)	None	None	None	None	G, 3
Piping Element	Pressure Boundary	Glass	Gas (Internal)	None	None	None	None	G, 3
Pump Casing	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Pressure Boundary	CASS	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Tank	Leakage Boundary (Spatial)	Galvanized Steel	Air-Indoor Controlled (External)	None	None	V.F-1 (EP-14)	3.2.1-51	C
Tank	Leakage Boundary (Spatial)	Galvanized Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F1-3 (A-08)	3.3.1-72	B

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	D
Tank	Leakage Boundary (Spatial)	Steel	Air-Indoor Controlled (External)	None	None	VII.J-20 (AP-2)	3.3.1-95	C
Tank	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2 (A-10)	3.3.1-56	B
Tank	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-20 (A-25)	3.3.1-47	B
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Controlled (External)	None	None	None	None	G, 10
Thermowell	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F1-16 (A-46)	3.3.1-25	E, 4, 8
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Controlled (External)	None	None	None	None	G, 12
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 7

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-15 (AP-12)	3.3.1-51	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.F1-17 (AP-43)	3.3.1-84	B
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F1-16 (A-46)	3.3.1-25	E, 4, 8
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Gray Cast Iron	Air-Indoor Controlled (External)	None	None	VII.J-20 (AP-2)	3.3.1-95	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-20 (A-25)	3.3.1-47	B

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.F3-18 (A-50)	3.3.1-85	B
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Controlled (External)	None	None	None	None	G, 10
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Valve Body	Pressure Boundary	Stainless Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B

Table 3.3.2-9

CONTROL BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Controlled (External)	None	None	VII.J-20 (AP-2)	3.3.1-95	A
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2 (A-10)	3.3.1-56	B
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Valve Body	Pressure Boundary	Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-6 (SP-59)	3.4.1-30	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F1-20 (A-25)	3.3.1-47	B

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

2 Unlike metals, Polymers do not display corrosion rates. Rather than depending on an oxide layer for protection, they depend on chemical resistance to the environment to which they are exposed. The plastic is either completely resistant to the environment or it deteriorates. Therefore, acceptability for the use of Polymers within a given environment is a design driven criterion. Once the appropriate material is chosen, the system will have no aging effects. This is consistent with Plant operating experience.

3 This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.

4 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.F1-16 copper alloy in condensation (External) environment exhibits loss of material due to pitting and crevice corrosion. Therefore, copper alloy in condensation (Internal) environment will exhibit the same aging effects/mechanisms.

5 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-16 steel in an indoor controlled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

6 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-1 galvanized steel in an indoor controlled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

7 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-3 copper alloy in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

8 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

9 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

10 NUREG-1801 does not include air-indoor controlled for stainless steel components. Similar to VII.J-15 for stainless steel in air-indoor uncontrolled, there are no aging effects for stainless steel in air-indoor controlled.

11 NUREG-1801 does not include air-indoor controlled for copper alloy components. Similar to V.F-3 for copper alloy in air-indoor uncontrolled, there are no aging effects for copper alloy in air-indoor controlled.

12 NUREG-1801 does not include air-indoor controlled for copper alloy >15% Zn components. Similar to V.F-3 for copper alloy in air-indoor uncontrolled, there are no aging effects for copper alloy >15% Zn in air-indoor controlled.

Table 3.3.2-10

DEMINERALIZED WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Drip Pan	Leakage Boundary (Spatial)	Galvanized Steel	Concrete (External)	None	None	VII.J-21 (AP-3)	3.3.1-96	C
Drip Pan	Leakage Boundary (Spatial)	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Filter Housing	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Filter Housing	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Filter Housing	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-15 (SP-61)	3.4.1-15	A A
Filter Housing	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-7 (AP-32)	3.3.1-84	B
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-10

DEMINERALIZED WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A

Table 3.3.2-10

DEMINERALIZED WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	V.C-4 (E-33)	3.2.1-3	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A

Table 3.3.2-10

DEMINERALIZED WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-15 (SP-61)	3.4.1-15	A A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-7 (AP-32)	3.3.1-84	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body (Containment Isolation)	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A

Table 3.3.2-10

DEMINERALIZED WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body (Containment Isolation)	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body (Containment Isolation)	Pressure Boundary	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	V.C-4 (E-33)	3.2.1-3	A A
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	V.C-4 (E-33)	3.2.1-3	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-11

DEWATERING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Filter Housing	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Housing	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Filter Housing	Leakage Boundary (Spatial)	CASS	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F2-7 (A-17)	3.3.1-11	E, 6
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Raw Water (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-1 (AP-75)	3.3.1-75	E, 5
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-2 (AP-76)	3.3.1-75	E, 5

Table 3.3.2-11

DEWATERING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5
Instrumentation Element	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Instrumentation Element	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Instrumentation Element	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 7

Table 3.3.2-11

DEWATERING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Orifice	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Orifice	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-9 (A-44)	3.3.1-81	E, 5
Orifice	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-13 (A-47)	3.3.1-84	B
Piping and Fittings	Leakage Boundary (Spatial)	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Leakage Boundary (Spatial)	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Copper Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.C1-9 (A-44)	3.3.1-81	E, 5
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-11

DEWATERING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 1
Piping Element	Leakage Boundary (Spatial)	Glass	Raw Water (Internal)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
Pump Casing	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Leakage Boundary (Spatial)	CASS	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5
Pump Casing	Leakage Boundary (Spatial)	Polymer (Polypropylene)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 2
Pump Casing	Leakage Boundary (Spatial)	Polymer (Polypropylene)	Air With Borated Water Leakage (External)	None	None	None	None	F, 2

Table 3.3.2-11

DEWATERING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	Polymer (Polypropylene)	Raw Water (Internal)	None	None	None	None	F, 2
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5
Valve Body	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-11

DEWATERING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	CASS	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 4
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-9 (A-44)	3.3.1-81	E, 5
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-13 (A-47)	3.3.1-84	B
Valve Body	Leakage Boundary (Spatial)	Polymer (PVC and Polypropylene)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 2

Table 3.3.2-11

DEWATERING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Polymer (PVC and Polypropylene)	Air With Borated Water Leakage (External)	None	None	None	None	F, 2
Valve Body	Leakage Boundary (Spatial)	Polymer (PVC and Polypropylene)	Air-Indoor Uncontrolled (Internal)	None	None	None	None	F, 2
Valve Body	Leakage Boundary (Spatial)	Polymer (PVC and Polypropylene)	Raw Water (Internal)	None	None	None	None	F, 2
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 3
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.

2 Unlike metals, Polymers do not display corrosion rates. Rather than depending on an oxide layer for protection, they depend on chemical resistance to the environment to which they are exposed. The plastic is either completely resistant to the environment or it deteriorates. Therefore, acceptability for the use of Polymers within a given environment is a design driven criterion. Once the appropriate material is chosen, the system will have no aging effects. This is consistent with Plant operating experience.

3 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

4 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-3 copper alloy in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

5 NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with ground water. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

6 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

7 NUREG-1801 specifies the Fire Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with ground water. Therefore, the Fire Water System Program is not applicable to this environment.

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Dryer Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Dryer Housing	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.H2-21 (A-23)	3.3.1-71	E, 6
Expansion Joint	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Expansion Joint	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Expansion Joint	Pressure Boundary	Stainless Steel	Diesel Exhaust (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-1 (AP-33)	3.3.1-6	E, 7
Expansion Joint	Pressure Boundary	Stainless Steel	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-2 (A-27)	3.3.1-18	E, 7
Expansion Joint	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-17 (AP-59)	3.3.1-33	B A
Fan Housing	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1 (A-10)	3.3.1-56	B
Fan Housing	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F4-1 (A-10)	3.3.1-56	E, 1, 8
Filter Element	Filter	Stainless Steel	Condensation (Internal/External)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Filter Element	Filter	Stainless Steel	Dried Air (Internal/External)	None	None	VII.J-18 (AP-20)	3.3.1-98	A

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Element	Filter	Stainless Steel	Fuel Oil (Internal/External)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-16 (AP-54)	3.3.1-32	B A
Filter Element	Filter	Stainless Steel	Lubricating Oil (Internal/External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-17 (AP-59)	3.3.1-33	B A
Filter Housing	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Filter Housing	Pressure Boundary	Aluminum	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.F4-10 (AP-74)	3.3.1-27	E, 9
Filter Housing	Pressure Boundary	Aluminum	Dried Air (Internal)	None	None	None	None	G, 5
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Housing	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Filter Housing	Pressure Boundary	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Filter Housing	Pressure Boundary	Steel	Dried Air (Internal)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
Filter Housing	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-24 (A-30)	3.3.1-20	B A
Filter Housing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-20 (AP-30)	3.3.1-14	B A
Flame Arrestor	Leakage Boundary (Spatial)	Aluminum	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Flame Arrestor	Leakage Boundary (Spatial)	Aluminum	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-7 (AP-35)	3.3.1-32	B A

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F4-6 (A-17)	3.3.1-11	E, 10
Flexible Hose	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F4-6 (A-17)	3.3.1-11	E, 7
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Elastomer	Closed Cycle Cooling Water (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Hose	Pressure Boundary	Elastomer	Condensation (Internal)	Hardening and Loss of Strength	Compressed Air Monitoring Program	None	None	G
Flexible Hose	Pressure Boundary	Elastomer	Lubricating Oil (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Hose	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flexible Hose	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Heat Exchanger Components (DG-MM-888A & 888B After Cooler Tubes)	Heat Transfer Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	Reduction of Heat Transfer	External Surfaces Monitoring Program	None	None	F
Heat Exchanger Components (DG-MM-888A & 888B After Cooler Tubes)	Heat Transfer Pressure Boundary	Aluminum	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.F4-10 (AP-74)	3.3.1-27	E, 9
Heat Exchanger Components (DG-MM-888A & 888B After Cooler Tubes)	Heat Transfer Pressure Boundary	Aluminum	Condensation (Internal)	Reduction of Heat Transfer	Compressed Air Monitoring Program	None	None	F
Heat Exchanger Components DG-E-41A & 41B Channel Head)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.H2-3 (AP-41)	3.3.1-59	B
Heat Exchanger Components (DG-E-41A & 41B Channel Head)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F4-8 (A-63)	3.3.1-48	B
Heat Exchanger Components (DG-E-41A & 41B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.H2-3 (AP-41)	3.3.1-59	B

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (DG-E-412A & 41B Shell)	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-5 (AP-39)	3.3.1-21	B A
Heat Exchanger Components (DG-E-41A & 41B Tubes)	Heat Transfer Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-10 (AP-47)	3.3.1-26	D C
Heat Exchanger Components (DG-E-41A & 41B Tubes)	Heat Transfer Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis Program One-Time Inspection Program	V.D1-8 (EP-47)	3.2.1-9	B A
Heat Exchanger Components (DG-E-41A & 41B Tubes)	Heat Transfer Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F3-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (DG-E-41A & 41B Tubes)	Heat Transfer Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	V.D1-3 (EP-37)	3.2.1-41	B
Heat Exchanger Components (DG-E-41A & 41B Tubes)	Heat Transfer Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.F3-12 (AP-80)	3.3.1-52	B
Heat Exchanger Components (DG-E-41A & 41B Tubesheet)	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-10 (AP-47)	3.3.1-26	D C

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (DG-E-41A & 41B Tubesheet)	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F3-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (DG-E-41A & 41B Tubesheet)	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	V.D1-3 (EP-37)	3.2.1-41	B
Heat Exchanger Components (DG-E-42A & 42B Channel Head)	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	C
Heat Exchanger Components (DG-E-42A & 42B Channel Head)	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	C
Heat Exchanger Components (DG-E-42A & 42B Channel Head)	Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-3 (A-65)	3.3.1-82	B
Heat Exchanger Components (DG-E-42A & 42B Channel Head Cover)	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	C
Heat Exchanger Components (DG-E-42A & 42B Channel Head Cover)	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	C
Heat Exchanger Components (DG-E-42A & 42B Channel Head Cover)	Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-3 (A-65)	3.3.1-82	B

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components DG-E-42A & 42B Channel Head Door)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.H2-3 (AP-41)	3.3.1-59	B
Heat Exchanger Components (DG-E-42A & 42B Channel Head Door)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (DG-E-42A & 42B Channel Head Door)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Heat Exchanger Components DG-E-42A & 42B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.H2-3 (AP-41)	3.3.1-59	B
Heat Exchanger Components (DG-E-42-A & -B Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (DG-E-42-A & -B Shell)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F4-8 (A-63)	3.3.1-48	B
Heat Exchanger Components (DG-E-42A & 42B Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F3-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (DG-E-42A & 42B Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.F3-12 (AP-80)	3.3.1-52	B

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (DG-E-42A & 42B Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-3 (A-65)	3.3.1-82	B
Heat Exchanger Components (DG-E-42A & 42B Tubes)	Heat Transfer Pressure Boundary	Copper Alloy	Raw Water (Internal)	Reduction of Heat Transfer	Open-Cycle Cooling Water System Program	VII.C1-6 (A-72)	3.3.1-83	B
Heat Exchanger Components (DG-E-42A & 42B Tubesheet)	Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F3-8 (AP-34)	3.3.1-51	B
Heat Exchanger Components (DG-E-42A & 42B Tubesheet)	Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-3 (A-65)	3.3.1-82	B
Heater Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heater Housing	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-23 (A-25)	3.3.1-47	B
Heater Housing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-20 (AP-30)	3.3.1-14	B A
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-8 (AP-12)	3.3.1-51	B
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.H2-12 (AP-43)	3.3.1-84	B
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Instrumentation Element	Pressure Boundary	Stainless Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-16 (AP-54)	3.3.1-32	B A
Instrumentation Element	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Instrumentation Element	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-20 (AP-30)	3.3.1-14	B A

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Pressure Boundary Structural Integrity (Attached) Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Orifice	Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 2
Orifice	Pressure Boundary Throttle	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 4
Piping and Fittings	Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-8 (AP-12)	3.3.1-51	B
Piping and Fittings	Pressure Boundary	Copper Alloy	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.G-9 (AP-78)	3.3.1-28	E, 9
Piping and Fittings	Pressure Boundary	Copper Alloy	Dried Air (Internal)	None	None	VII.J-3 (AP-8)	3.3.1-98	A

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Copper Alloy	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-9 (AP-44)	3.3.1-32	B A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 2
Piping and Fittings	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Piping and Fittings	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-16 (AP-54)	3.3.1-32	B A
Piping and Fittings	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-17 (AP-59)	3.3.1-33	B A

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Stainless Steel	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.H2-19 (AP-56)	3.3.1-29	E, 11
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B

Table 3.3.2-12

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Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-23 (A-25)	3.3.1-47	B
Piping and Fittings	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.H2-21 (A-23)	3.3.1-71	E, 6
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-2 (A-27)	3.3.1-18	B
Piping and Fittings	Pressure Boundary	Steel	Dried Air (Internal)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-24 (A-30)	3.3.1-20	B A

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-20 (AP-30)	3.3.1-14	B A
Piping Element	Leakage Boundary (Spatial) Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial) Pressure Boundary	Glass	Closed Cycle Cooling Water (Internal)	None	None	None	None	G, 3
Piping Element	Pressure Boundary	Glass	Lubricating Oil (Internal)	None	None	VII.J-10 (AP-15)	3.3.1-93	A
Pump Casing	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-23 (A-25)	3.3.1-47	B
Pump Casing	Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-8 (A-50)	3.3.1-85	B

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Pressure Boundary	Gray Cast Iron	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-24 (A-30)	3.3.1-20	B A
Pump Casing	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-20 (AP-30)	3.3.1-14	B A
Pump Casing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-23 (A-25)	3.3.1-47	B
Pump Casing	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-24 (A-30)	3.3.1-20	B A
Pump Casing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-20 (AP-30)	3.3.1-14	B A
Silencer	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Silencer	Pressure Boundary	Steel	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-2 (A-27)	3.3.1-18	B

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Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Strainer	Filter	Stainless Steel	Lubricating Oil (Internal/External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-17 (AP-59)	3.3.1-33	B A
Tank	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-23 (A-25)	3.3.1-47	B
Tank	Pressure Boundary	Steel	Dried Air (Internal)	None	None	VII.J-22 (AP-4)	3.3.1-98	C
Tank	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-24 (A-30)	3.3.1-20	B A
Tank	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-20 (AP-30)	3.3.1-14	D C
Thermowell	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B

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DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Trap	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3	3.2.1-50	A
Trap	Pressure Boundary	Aluminum	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.F4-10 (AP-74)	3.3.1-27	E, 9
Trap	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Trap	Pressure Boundary	Gray Cast Iron	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.H2-21 (A-23)	3.3.1-71	E, 6
Valve Body	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Valve Body	Leakage Boundary (Spatial)	Aluminum	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Pressure Boundary	Aluminum	Dried Air (Internal)	None	None	None	None	G, 5
Valve Body	Leakage Boundary (Spatial)	Aluminum	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-7 (AP-35)	3.3.1-32	B A

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.G-9 (AP-78)	3.3.1-28	E, 9
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 4
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-8 (AP-12)	3.3.1-51	B
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.H2-12 (AP-43)	3.3.1-84	B
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.G-9 (AP-78)	3.3.1-28	E, 9
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Dried Air (Internal)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-9 (AP-44)	3.3.1-32	B A

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Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-10 (AP-47)	3.3.1-26	B A
Valve Body	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-23 (A-25)	3.3.1-47	B
Valve Body	Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-8 (A-50)	3.3.1-85	B
Valve Body	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-20 (AP-30)	3.3.1-14	B A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

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DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 2
Valve Body	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Valve Body	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Valve Body	Pressure Boundary	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
Valve Body	Pressure Boundary	Stainless Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-16 (AP-54)	3.3.1-32	B A
Valve Body	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-17 (AP-59)	3.3.1-33	B A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-12

DIESEL GENERATOR

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Valve Body	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.H2-23 (A-25)	3.3.1-47	B
Valve Body	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.H2-21 (A-23)	3.3.1-71	E, 6
Valve Body	Structural Integrity (Attached)	Steel	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-2 (A-27)	3.3.1-18	B
Valve Body	Pressure Boundary	Steel	Dried Air (Internal)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
Valve Body	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H2-24 (A-30)	3.3.1-20	B A
Valve Body	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-20 (AP-30)	3.3.1-14	B A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.F4-1steel in an indoor uncontrolled air (External) environment exhibits loss of material due to general corrosion. Therefore, steel in an indoor uncontrolled air (Internal) environment will exhibit the same aging effects/mechanisms.

2 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

3 This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.

4 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-3 copper alloy in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

5 Aluminum exposed to dried air environment does not have any applicable aging effect (Reference Hollingsworth, E.H. and Hunsicker, H.Y. 1979 “Corrosion Resistance of Aluminum and Aluminum Alloys and Metals Handbook Ninth Edition Volume 2, Properties and Selection: Nonferrous Alloys and Pure metals, pages 204-236)

6 NUREG-1801 specifies the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program for this line item. The Compressed Air Monitoring Program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The Diesel Generator Starting Air is part of the Compressed Air Monitoring Program at Seabrook and therefore, the Internal Surfaces in Miscellaneous Piping and Ducting Components program is not applicable.

7 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

8 NUREG-1801 specifies the External Surfaces Monitoring Program for this line item. Since the environment for this component type and material combination is internal, the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

9 NUREG-1801 specifies a plant-specific program for this line item for this line item. The Compressed Air Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

10 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

11 NUREG-1801 specifies a plant-specific program for this line item. The Buried Piping and Tank Inspection Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-13

DIESEL GENERATOR AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting Closure Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F4-3 (A-105)	3.3.1-55	B
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F4-6 (A-17)	3.3.1-11	E,1
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F4-4 (A-73)	3.3.1-34	E,1
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F4-6 (A-17)	3.3.1-11	E, 2

Table 3.3.2-13

DIESEL GENERATOR AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F4-5 (A-18)	3.3.1-34	E, 2
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1 (A-10)	3.3.1-56	B
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

2 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-14

EMERGENCY FEED WATER PUMP HOUSE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Damper Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting Closure Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-4 (A-105)	3.3.1-55	B
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B

Table 3.3.2-14

EMERGENCY FEED WATER PUMP HOUSE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F2-7 (A-17)	3.3.1-11	E, 1
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-5 (A-73)	3.3.1-34	E, 1
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength / Elastomer Degradation	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-7 (A-17)	3.3.1-11	E, 2
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-6 (A-18)	3.3.1-34	E, 2

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies a plant-specific program. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

2 NUREG-1801 specifies a plant-specific program. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Bolting	Pressure Boundary	Steel	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	None	None	G
Bolting	Pressure Boundary	Steel	Soil (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Filter Element	Filter	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Element	Filter	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Filter Element	Filter	Stainless Steel	Gas (External)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Filter Element	Filter	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Filter Element	Filter	Stainless Steel	Raw Water (External)	Loss of Material	Fire Water System Program	VII.G-19 (A-55)	3.3.1-69	A

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Element	Filter	Stainless Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-19 (A-55)	3.3.1-69	A
Filter Housing	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Filter Housing	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Filter Housing	Pressure Boundary	Copper Alloy	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-9 (AP-78)	3.3.1-28	E, 2
Filter Housing	Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-12 (A-45)	3.3.1-70	A
Filter Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	A
Filter Housing	Pressure Boundary	Galvanized Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Filter Housing	Pressure Boundary	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Filter Housing	Pressure Boundary	Galvanized Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Filter Housing	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Filter Housing	Pressure Boundary	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Gray Cast Iron	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-23 (A-23)	3.3.1-71	B
Filter Housing	Pressure Boundary	Gray Cast Iron	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
Filter Housing	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Filter Housing	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-14 (A-51)	3.3.1-85	B
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Filter Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Filter Housing	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fire Protection Program Fuel Oil Chemistry	VII.G-21 (A-28)	3.3.1-64	A B
Filter Housing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-22 (AP-30)	3.3.1-14	B A
Filter Housing	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Flexible Hose	Pressure Boundary	Elastomer	Air - Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F4-6 (A-17)	3.3.1-11	B

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Pressure Boundary	Elastomer	Closed Cycle Cooling Water (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Hose	Pressure Boundary	Elastomer	Fuel Oil (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Hose	Pressure Boundary	Elastomer	Lubricating Oil (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Hose	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flexible Hose	Pressure Boundary	Stainless Steel	Diesel Exhaust (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-1 (AP-33)	3.3.1-6	E, 2
Flexible Hose	Pressure Boundary	Stainless Steel	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-2 (A-27)	3.3.1-18	E, 2
Heat Exchanger Components (FP-E-46 & 47 Channel Head)	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.G-5 (AP-41)	3.3.1-59	B

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (FP-E-46 & 47 Channel Head)	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.C1-5 (A-64)	3.3.1-77	E, 3
Heat Exchanger Components (FP-E-46 & 47 Channel Head)	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-14 (A-51)	3.3.1-85	D
Heat Exchanger Components (FP-E-46 & 47 Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.G-5 (AP-41)	3.3.1-59	B
Heat Exchanger Components (FP-E-46 & 47 Shell)	Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	C
Heat Exchanger Components (FP-E-46 & 47 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Steam (External)	Cracking	Water Chemistry Program	VIII.A-10 (SP-44)	3.4.1-39	C
Heat Exchanger Components (FP-E-46 & 47 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Steam (External)	Loss of Material	Water Chemistry Program	VIII.A-12 (SP-43)	3.4.1-37	C
Heat Exchanger Components (FP-E-46 & 47 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Steam (External)	Reduction of Heat Transfer	Water Chemistry Program	None	None	G
Heat Exchanger Components (FP-E-46 & 47 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	V.D1-5 (E-20)	3.2.1-39	E, 3

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (FP-E-46 & 47 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Raw Water (Internal)	Reduction of Heat Transfer	Fire Water System Program	VII.G-7 (AP-61)	3.3.1-83	E, 3
Heat Exchanger Components (FP-E-46 & 47 Tubesheet)	Pressure Boundary	Stainless Steel	Steam (External)	Cracking	Water Chemistry Program	VIII.A-10 (SP-44)	3.4.1-39	C
Heat Exchanger Components (FP-E-46 & 47 Tubesheet)	Pressure Boundary	Stainless Steel	Steam (External)	Loss of Material	Water Chemistry Program	VIII.A-12 (SP-43)	3.4.1-37	C
Heat Exchanger Components (FP-E-46 & 47 Tubesheet)	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	V.D1-5 (E-20)	3.2.1-39	E, 3
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy > 15% ZN	Air Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy > 15% ZN	Air Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 4
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-19 (A-55)	3.3.1-69	A

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Piping and Fittings	Pressure Boundary	Aluminum	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F1-14 (AP-74)	3.3.1-27	E, 2
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.G-10 (AP-44)	3.3.1-32	B A
Piping and Fittings	Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-12 (A-45)	3.3.1-70	A
Piping and Fittings	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	A
Piping and Fittings	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	A
Piping and Fittings	Pressure Boundary	Galvanized Steel	Raw Water (External)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Piping and Fittings	Pressure Boundary	Galvanized Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Pressure Boundary	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary	Gray Cast Iron	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-23 (A-23)	3.3.1-71	B
Piping and Fittings	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Piping and Fittings	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-14 (A-51)	3.3.1-85	B
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-18 (AP-59)	3.3.1-33	B A
Piping and Fittings	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-19 (A-55)	3.3.1-69	A

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Piping and Fittings	Pressure Boundary	Steel	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.G-25 (A-01)	3.3.1-19	B
Piping and Fittings	Pressure Boundary	Steel	Raw Water (External)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Piping and Fittings	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-23 (A-23)	3.3.1-71	B

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Steel	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-2 (A-27)	3.3.1-18	E, 2
Piping and Fittings	Pressure Boundary	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Piping and Fittings (Containment Isolation)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.C-1 (E-35)	3.2.1-31	B
Piping and Fittings (Containment Isolation)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.E-9 (E-28)	3.2.1-45	A
Piping and Fittings (Containment Isolation)	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	V.C-5 (E-22)	3.2.1-35	E, 3
Piping Element	Leakage Boundary (Spatial) Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-8 (AP-14)	3.3.1-93	A, 5

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping Element	Pressure Boundary	Glass	Raw Water (Internal)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
Pump Casing	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Pump Casing	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-14 (A-51)	3.3.1-85	B
Pump Casing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-19 (A-55)	3.3.1-69	A
Sprinkler Head	Pressure Boundary Spray	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Sprinkler Head	Pressure Boundary Spray	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Sprinkler Head	Pressure Boundary Spray	Copper Alloy	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Sprinkler Head	Pressure Boundary Spray	Copper Alloy	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-12 (A-45)	3.3.1-70	A
Sprinkler Head	Pressure Boundary Spray	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Sprinkler Head	Pressure Boundary Spray	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Sprinkler Head	Pressure Boundary Spray	Gray Cast Iron	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Tank	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	Aboveground Steel Tanks Program	VII.H1-11 (A-95)	3.3.1-40	A
Tank	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	C
Thermowell	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-19 (A-55)	3.3.1-69	A
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Valve Body	Pressure Boundary	Copper Alloy	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 4
Valve Body	Pressure Boundary	Copper Alloy	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-9 (AP-78)	3.3.1-28	E, 2
Valve Body	Pressure Boundary	Copper Alloy	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
Valve Body	Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-12 (A-45)	3.3.1-70	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 4

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-9 (AP-78)	3.3.1-28	E, 2
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-12 (A-45)	3.3.1-70	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-13 (A-47)	3.3.1-84	B
Valve Body	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Pressure Boundary	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Pressure Boundary	Gray Cast Iron	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Valve Body	Pressure Boundary	Gray Cast Iron	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.G-25 (A-01)	3.3.1-19	B
Valve Body	Pressure Boundary	Gray Cast Iron	Soil (External)	Loss of Material	Selective Leaching of Materials Program	VII.G-15 (A-02)	3.3.1-85	B
Valve Body	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Gray Cast Iron	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
Valve Body	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Valve Body	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-14 (A-51)	3.3.1-85	B
Valve Body	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-18 (AP-59)	3.3.1-33	B A
Valve Body	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-19 (A-55)	3.3.1-69	A
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Pressure Boundary	Steel	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.G-25 (A-01)	3.3.1-19	B

Table 3.3.2-15

FIRE PROTECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
Valve Body	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	A
Valve Body (Containment Isolation)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	V.C-1 (E-35)	3.2.1-31	B
Valve Body (Containment Isolation)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	V.E-9 (E-28)	3.2.1-45	A
Valve Body (Containment Isolation)	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Fire Water System Program	V.C-5 (E-22)	3.2.1-35	E, 3
Vortex Plate	Direct Flow	Steel	Raw Water (External/Internal)	Loss of Material	Fire Water System Program	VII.G-24 (A-33)	3.3.1-68	C

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

2 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3 NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Fire Water System Program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with the Fire Protection System. Therefore, the Open Cycle Cooling Water System Program is not applicable to this environment.

4 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-3 copper alloy in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

5 Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-6 glass in an indoor, uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore, remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

Table 3.3.2-16

FUEL HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F2-7 (A-17)	3.3.1-11	E, 2
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Treated Water (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-16

FUEL HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-15 (SP-61)	3.4.1-15	A A
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-7 (AP-32)	3.3.1-84	B

Table 3.3.2-16

FUEL HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 1
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Water (Internal)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A

Table 3.3.2-16

FUEL HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.G-41 (S-13)	3.4.1-6	A A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-15 (SP-61)	3.4.1-15	A A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-7 (AP-32)	3.3.1-84	B
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-16

FUEL HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.

2 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-17

FUEL OIL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Material	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	Bolting Integrity Program	VII.I-1 (AP-28)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Filter Element	Filter	Steel	Fuel Oil (Internal/External)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A
Flame Arrestor	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Flame Arrestor	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Piping and Fittings	Pressure Boundary	Gray Cast Iron	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B

Table 3.3.2-17

FUEL OIL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Piping and Fittings	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fire Protection Program Fuel Oil Chemistry	VII.G-21 (A-28)	3.3.1-64	A B
Piping and Fittings	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A
Tank	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	Aboveground Steel Tanks Program	VII.H1-11 (A-95)	3.3.1-40	A
Tank	Pressure Boundary	Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-10 (A-30)	3.3.1-20	B A

Table 3.3.2-17

FUEL OIL SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Copper Alloy	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Pressure Boundary	Copper Alloy	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.H1-3 (AP-44)	3.3.1-32	B A
Valve Body	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Pressure Boundary	Stainless Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry One-Time Inspection Program	VII.G-17 (AP-54)	3.3.1-32	B A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-18

FUEL STORAGE BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Damper Housing	Fire Barrier Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Fire Barrier Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Damper Housing	Fire Barrier Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Damper Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

Table 3.3.2-18

FUEL STORAGE BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting Closure Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Ducting Closure Bolting	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Ducting Closure Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-4 (A-105)	3.3.1-55	B

Table 3.3.2-18

FUEL STORAGE BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Ducting Closure Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	C
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Fan Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Filter Housing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 1
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B

Table 3.3.2-18

FUEL STORAGE BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F2-7 (A-17)	3.3.1-11	E, 3
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-5 (A-73)	3.3.1-34	E, 3
Flexible Connector	Pressure Boundary	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary	Elastomer	Air With Borated Water Leakage (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-7 (A-17)	3.3.1-11	E, 4
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-6 (A-18)	3.3.1-34	E, 4

Table 3.3.2-18

FUEL STORAGE BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 2
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-1 (A-09)	3.3.1-27	E, 4

Table 3.3.2-18

FUEL STORAGE BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 2
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-18

FUEL STORAGE BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

2	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-3 copper alloy in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.
3	NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.
4	NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Bolting	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.D-1 (A-103)	3.3.1-44	A
Bolting	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-11 (S-10)	3.4.1-4	A A

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.A3-7 (AP-31)	3.3.1-85	B
Heat Exchanger Components (HWS-E-44 and 132 Channel Head)	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (HWS-E-44 and 132 Channel Head)	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (HWS-E-44 and 132 Channel Head)	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-37 (S-19)	3.4.1-3	A A
Heat Exchanger Components (HWS-E-44 and 132 Channel Head)	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.A3-7 (AP-31)	3.3.1-85	D
Heat Exchanger Components (HWS-E-44 and 132 Shell)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (HWS-E-44)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (HWS-E-44 and 132 Shell)	Leakage Boundary (Spatial)	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	C C
Heater Coil (HWS-H-6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 17)	Leakage Boundary (Spatial)	Copper Alloy	Air - Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Heater Coil (HWS-H-6, 7, 8, 9, 10, 11, 12, 13, 14, and 15)	Leakage Boundary (Spatial)	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Heater Coil (HWS-H-6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 17)	Leakage Boundary (Spatial)	Copper Alloy	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.A-5 (SP-61)	3.4.1-15	A A
Heater Coil (Unit Heater)	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Heater Coil (Unit Heater)	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Heater Coil (Unit Heater)	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.A-5 (SP-61)	3.4.1-15	A A
Heater Coil (Unit Heater)	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-7 (AP-32)	3.3.1-84	B

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Instrumentation Element	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Instrumentation Element	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-11 (S-10)	3.4.1-4	A A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-4 (A-103)	3.3.1-54	E, 2
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-4 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140°F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.B1-5 (SP-17)	3.4.1-14	A A

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-11 (S-10)	3.4.1-4	A A
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 1
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Water (Internal)	None	None	VII.J-13 (AP-51)	3.3.1-93	A

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-11 (S-10)	3.4.1-4	A A
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.A3-7 (AP-31)	3.3.1-85	B
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-4 (SP-16)	3.4.1-16	A A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140°F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.B1-5 (SP-17)	3.4.1-14	A A

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial)	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Tank	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.A3-7 (AP-31)	3.3.1-85	D
Tank	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-17)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-4 (SP-16)	3.4.1-16	A A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140°F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.B1-5 (SP-17)	3.4.1-14	A A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.A-5 (SP-61)	3.4.1-15	A A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-7 (AP-32)	3.3.1-84	B
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Condensation (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-11 (S-10)	3.4.1-4	A A
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.A3-7 (AP-31)	3.3.1-85	B
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-4 (A-103)	3.3.1-54	E, 2

Table 3.3.2-19

HOT WATER HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-4 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140°F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.B1-5 (SP-17)	3.4.1-14	A A
Valve Body	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-11 (S-10)	3.4.1-4	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.
2	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.D-4 stainless steel in a condensation (Internal) environment exhibits loss of material due to pitting and crevice corrosion. Therefore, stainless steel in a condensation (External) environment will exhibit the same aging effects/mechanisms.

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Dryer Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Dryer Housing	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	A
Filter Element	Filter	Stainless Steel	Condensation (Internal/External)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A, 1
Filter Housing	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Filter Housing	Pressure Boundary	Aluminum	Dried Air (Internal)	None	None	None	None	G, 3

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Filter Housing	Pressure Boundary	Gray Cast Iron	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	A
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Housing	Pressure Boundary	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Filter Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Filter Housing	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	A

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Steel	Dried Air (Internal)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
Filter Housing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	B A
Flexible Hose	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F1-7 (A-17)	3.3.1-11	E, 4
Flexible Hose	Pressure Boundary	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Hose	Pressure Boundary	Elastomer	Condensation (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Hose	Pressure Boundary	Elastomer	Dried Air (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Flexible Hose	Pressure Boundary	Polymer (Fluoropolymer)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 2
Flexible Hose	Pressure Boundary	Polymer (Fluoropolymer)	Air With Borated Water Leakage (External)	None	None	None	None	F, 2

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Pressure Boundary	Polymer (Fluoropolymer)	Dried Air (Internal)	None	None	None	None	F, 2
Flexible Hose	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Flexible Hose	Pressure Boundary	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
Heat Exchanger Components (SA-E-221A & 221B Tubes)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (SA-E-221A & 221B Tubes)	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	C

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (SA-E-222A, 222B, & 222C Tubes)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (SA-E-222A, 222B, & 222C Tubes)	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	C
Heat Exchanger Components (SA-E-223A & 223B Tubes)	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	C
Heat Exchanger Components (SA-E-223A & 223B Tubes)	Pressure Boundary	Aluminum	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	None	None	F
Heat Exchanger Components (IA-D-2A & 2B Chiller Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Heat Exchanger Components (IA-D-2A & 2B Chiller Shell)	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	C
Heat Exchanger Components (IA-D-2A & 2B Reheater Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Heat Exchanger Components (IA-D-2A & 2B Reheater Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

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INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (IA-D-2A & 2B Reheater Shell)	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	C
Heat Exchanger Components (SA-MM-12A & 12B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Heat Exchanger Components (SA-MM-12A & 12B Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (SA-MM-12A & 12B Shell)	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	C
Instrumentation Element	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Instrumentation Element	Pressure Boundary	Aluminum	Dried Air (Internal)	None	None	None	None	G, 3
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
Orifice	Pressure Boundary Throttle	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Orifice	Pressure Boundary Throttle	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	B A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Copper Alloy	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.G-9 (AP-78)	3.3.1-28	E, 5
Piping and Fittings	Pressure Boundary	Copper Alloy	Dried Air (Internal)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
Piping and Fittings	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Pressure Boundary	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Piping and Fittings	Pressure Boundary	Copper Alloy >15% Zn	Dried Air (Internal)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
Piping and Fittings	Pressure Boundary	Polymer (CPVC)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 2
Piping and Fittings	Pressure Boundary	Polymer (CPVC)	Air With Borated Water Leakage (External)	None	None	None	None	F, 2
Piping and Fittings	Pressure Boundary	Polymer (CPVC)	Dried Air (Internal)	None	None	None	None	F, 2
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-9 (A-78)	3.3.1-58	B
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	A

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Dried Air (Internal)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
Piping and Fittings	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	B A
Pump Casing	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Pump Casing	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	B A
Pump Casing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Pump Casing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Pump Casing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	B A

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	C
Tank	Pressure Boundary	Copper Alloy >15% Zn	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.G-9 (AP-78)	3.3.1-28	E, 5
Tank	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Tank	Pressure Boundary	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Pressure Boundary	Gray Cast Iron	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	C
Tank	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	D C
Tank	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Pressure Boundary	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	C

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Tank	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	C
Tank	Pressure Boundary	Steel	Dried Air (Internal)	None	None	VII.J-22 (AP-4)	3.3.1-98	C
Tank	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	D C
Thermowell	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Trap	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Trap	Pressure Boundary	Aluminum	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.A3-4 (AP-1)	3.3.1-88	A
Trap	Pressure Boundary	Aluminum	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.F1-14 (AP-74)	3.3.1-27	A
Trap	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Trap	Pressure Boundary	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Trap	Pressure Boundary	Gray Cast Iron	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	A
Valve Body	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Valve Body	Pressure Boundary	Aluminum	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.A3-4 (AP-1)	3.3.1-88	A
Valve Body	Pressure Boundary	Aluminum	Dried Air (Internal)	None	None	None	None	G, 3

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Aluminum	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	None	None	G
Valve Body	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	CASS	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Valve Body	Pressure Boundary	CASS	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Valve Body	Pressure Boundary	Copper Alloy	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.G-9 (AP-78)	3.3.1-28	E, 5

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Copper Alloy	Dried Air (Internal)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.G-9 (AP-78)	3.3.1-28	E, 5
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Dried Air (Internal)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-8 (AP-47)	3.3.1-26	B A
Valve Body	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	A
Valve Body	Pressure Boundary	Stainless Steel	Dried Air (Internal)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
Valve Body	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-14 (AP-59)	3.3.1-33	B A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-3 (A-80)	3.3.1-57	B
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Condensation (Internal)	Loss of Material	Compressed Air Monitoring Program	VII.D-2 (A-26)	3.3.1-53	A

Table 3.3.2-20

INSTRUMENT AIR SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Dried Air (Internal)	None	None	VII.J-22 (AP-4)	3.3.1-98	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.D-4 stainless steel in a condensation (Internal) environment exhibits loss of material due to pitting and crevice corrosion. Therefore, stainless steel in a condensation (External) environment will exhibit the same aging effects/mechanisms.

2 Unlike metals, Polymers do not display corrosion rates. Rather than depending on an oxide layer for protection, they depend on chemical resistance to the environment to which they are exposed. The plastic is either completely resistant to the environment or it deteriorates. Therefore, acceptability for the use of Polymers within a given environment is a design driven criterion. Once the appropriate material is chosen, the system will have no aging effects. This is consistent with Plant operating experience.

3 Aluminum exposed to dried air environment does not have any applicable aging effect (Reference Hollingsworth, E.H. and Hunsicker, H.Y. 1979 “Corrosion Resistance of Aluminum and Aluminum Alloys and Metals Handbook Ninth Edition Volume 2, Properties and Selection: Nonferrous Alloys and Pure metals, pages 204-236)

4 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

5 NUREG-1801 specifies a plant-specific program for this line item. The Compressed Air Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-21

LEAK DETECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Piping and Fittings	Structural Integrity (Attached) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Structural Integrity (Attached) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Structural Integrity (Attached) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Valve Body	Structural Integrity (Attached) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Structural Integrity (Attached) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-21

LEAK DETECTION SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Structural Integrity (Attached) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

Table 3.3.2-22

MECHANICAL SEAL SUPPLY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-79)	3.3.1-89	A
Heat Exchanger Components (MSS-E-130 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (MSS-E-130 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (MSS-E-130 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-27 (S-22)	3.4.1-16	A A
Heat Exchanger Components (MSS-E-130 Shell)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-22

MECHANICAL SEAL SUPPLY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (MSS-E-130 Shell)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (MSS-E-130 Shell)	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-1 (A-63)	3.3.1-48	B
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-1 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-1 (SP-16)	3.4.1-16	A A

Table 3.3.2-22

MECHANICAL SEAL SUPPLY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Leakage Boundary (Spatial)	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-1 (SP-16)	3.4.1-16	A A
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-22

MECHANICAL SEAL SUPPLY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-1 (SP-16)	3.4.1-16	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-23

MISCELLANEOUS EQUIPMENT

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F1-7 (A-17)	3.3.1-11	E, 1
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Lubricating Oil (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-23

MISCELLANEOUS EQUIPMENT

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-14 (AP-59)	3.3.1-33	B A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	B A
Pump Casing	Leakage Boundary (Spatial)	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Pump Casing	Leakage Boundary (Spatial)	Aluminum	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.A3-4 (AP-1)	3.3.1-88	A
Pump Casing	Leakage Boundary (Spatial)	Aluminum	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	None	None	G
Tank	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-23

MISCELLANEOUS EQUIPMENT

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Leakage Boundary (Spatial)	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	D C
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-8 (AP-47)	3.3.1-26	B A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-14 (AP-59)	3.3.1-33	B A

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-24

NITROGEN GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A

Table 3.3.2-24

NITROGEN GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A

Table 3.3.2-24

NITROGEN GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII-I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary Structural Integrity (Attached)	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
Piping and Fittings	Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.A-16 (S-06)	3.4.1-2	A A
Valve Body	Pressure Boundary Structural Integrity (Attached)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-24

NITROGEN GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary Structural Integrity (Attached)	CASS	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A

Table 3.3.2-24

NITROGEN GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
Valve Body	Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.A-16 (S-06)	3.4.1-2	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-25

OIL COLLECTION FOR REACTOR COOLANT PUMPS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Drip Pan	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Drip Pan	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Drip Pan	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-18 (AP-59)	3.3.1-33	B A
Flame Arrester	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flame Arrester	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Flame Arrester	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-18 (AP-59)	3.3.1-33	B A
Flexible Hose	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-25

OIL COLLECTION FOR REACTOR COOLANT PUMPS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Flexible Hose	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-18 (AP-59)	3.3.1-33	B A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-18 (AP-59)	3.3.1-33	B A
Tank	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Tank	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-18 (AP-59)	3.3.1-33	D C

Table 3.3.2-25

OIL COLLECTION FOR REACTOR COOLANT PUMPS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-27 (A-82)	3.3.1-16	B A
Valve Body	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.G-18 (AP-59)	3.3.1-33	B A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-26

PLANT FLOOR DRAIN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Piping and Fittings	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 2
Piping and Fittings	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-14 (A-51)	3.3.1-85	B
Piping and Fittings	Leakage Boundary (Spatial)	Polymer (PVC)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 1
Piping and Fittings	Leakage Boundary (Spatial)	Polymer (PVC)	Raw Water (Internal)	None	None	None	None	F, 1
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-26

PLANT FLOOR DRAIN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-19 (A-55)	3.3.1-69	E, 2
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Pressure Boundary	Steel	Concrete (External)	None	None	VII.J-21 (AP-3)	3.3.1-96	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.H1-9 (A-01)	3.3.1-19	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 2
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 2

Table 3.3.2-26

PLANT FLOOR DRAIN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-14 (A-51)	3.3.1-85	B
Pump Casing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-19 (A-55)	3.3.1-69	E, 2
Tank	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 2
Valve Body	Leakage Boundary (Spatial)	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-9 (A-44)	3.3.1-81	E, 3
Valve Body	Leakage Boundary (Spatial)	Polymer (PVC)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 1

Table 3.3.2-26

PLANT FLOOR DRAIN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Polymer (PVC)	Raw Water (Internal)	None	None	None	None	F, 1
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 2

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Unlike metals, Polymers do not display corrosion rates. Rather than depending on an oxide layer for protection, they depend on chemical resistance to the environment to which they are exposed. The plastic is either completely resistant to the environment or it deteriorates. Therefore, acceptability for the use of Polymers within a given environment is a design driven criterion. Once the appropriate material is chosen, the system will have no aging effects. This is consistent with Plant operating experience.

2 NUREG-1801 specifies the Fire Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with water from plant sumps and drains. Therefore, the Fire Water System Program is not applicable to this environment.

3 NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with water from plant sumps and drains. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

Table 3.3.2-27

POTABLE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Heater Housing (Hot Water Heater PW-H-26)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heater Housing (Hot Water Heater PW-H-26)	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 1
Piping and Fittings	Leakage Boundary (Spatial)	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Leakage Boundary (Spatial)	Copper Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-12 (A-45)	3.3.1-70	E, 1
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-19 (A-55)	3.3.1-69	E, 1

Table 3.3.2-27

POTABLE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 1
Valve Body	Leakage Boundary (Spatial)	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-12 (A-45)	3.3.1-70	E, 1
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-12 (A-45)	3.3.1-70	E, 1
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-13 (A-47)	3.3.1-84	B

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies the Fire Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with domestic water from the town of Seabrook. Therefore, the Fire Water System Program is not applicable to this environment.

Table 3.3.2-28

PRIMARY AUXILIARY BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Damper Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

Table 3.3.2-28

PRIMARY AUXILIARY BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Ducting	Pressure Boundary Structural Integrity (Attached)	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting Closure Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-4 (A-105)	3.3.1-55	B
Ducting Closure Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	C
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B

Table 3.3.2-28

PRIMARY AUXILIARY BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Fan Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Filter Housing	Leakage Boundary (Spatial) Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Filter Housing	Leakage Boundary (Spatial) Structural Integrity (Attached)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Filter Housing	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F2-18 (A-25)	3.3.1-47	B
Filter Housing	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D

Table 3.3.2-28

PRIMARY AUXILIARY BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F2-7 (A-17)	3.3.1-11	E, 1
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-5 (A-73)	3.3.1-34	E, 1
Flexible Connector	Pressure Boundary	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary	Elastomer	Air With Borated Water Leakage (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength n	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-7 (A-17)	3.3.1-11	E, 2
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-6 (A-18)	3.3.1-34	E, 2
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

Table 3.3.2-28

PRIMARY AUXILIARY BUILDING AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F2-18 (A-25)	3.3.1-47	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F2-18 (A-25)	3.3.1-47	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.F3-18 (A-50)	3.3.1-85	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.F2-18 (A-25)	3.3.1-47	B

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

2 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Stainless Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.F1-1 (A-09)	3.3.1-27	E,7
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Bolting	Pressure Boundary	Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.D-1 (A-103)	3.3.1-44	A
Flexible Hose	Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	VII-J-14 (AP-16)	3.3.1-94	A
Flexible Hose	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 2
Flexible Hose	Pressure Boundary	Nickel Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	None	None	G

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1 (A-09)	3.3.1-27	E, 5
Flexible Hose	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Heat Exchanger Components (CC-E-17A & B Channel Head)	Pressure Boundary	Titanium	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 3

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CC-E-17A & B Channel Head)	Pressure Boundary	Titanium	Air With Borated Water Leakage (External)	None	None	None	None	F, 4
Heat Exchanger Components (CC-E-17A & B Channel Head)	Pressure Boundary	Titanium	Raw Water (Internal)	None	None	None	None	F, 3
Heat Exchanger Components (CC-E-17A & B Channel Head Cover)	Pressure Boundary	Steel With Titanium Cladding	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CC-E-17A & B Channel Head Cover)	Pressure Boundary	Steel With Titanium Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (CC-E-17A & B Channel Head Cover)	Pressure Boundary	Steel With Titanium Cladding	Raw Water (Internal)	None	None	None	None	F, 3
Heat Exchanger Components (CC-E-17A & B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CC-E-17A & B Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (CC-E-17A & B Shell)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-1 (A-63)	3.3.1-48	B

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CC-E-17A & B Tubes)	Heat Transfer Pressure Boundary	Titanium	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	None	None	F
Heat Exchanger Components (CC-E-17A & B Tubes)	Heat Transfer Pressure Boundary	Titanium	Raw Water (Internal)	Reduction of Heat Transfer	Open-Cycle Cooling Water System Program	None	None	F
Heat Exchanger Components (CC-E-17A & B Tubesheet)	Pressure Boundary	Steel With Titanium Cladding	Raw Water (Internal)	None	None	None	None	F, 3
Heat Exchanger Components (CC-E-17A & B Tubesheet)	Pressure Boundary	Steel With Titanium Cladding	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-1 (A-63)	3.3.1-48	B
Heat Exchanger Components (CC-E-153A & B Channel Head)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (CC-E-153A & B Channel Head)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (CC-E-153A & B Channel Head)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-1 (A-63)	3.3.1-48	B
Heat Exchanger Components (CC-E-153A & B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (CC-E-153A & B Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (CC-E-153A & B Shell)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-1 (A-63)	3.3.1-48	B
Heat Exchanger Components (CC-E-153A & B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	D
Heat Exchanger Components (CC-E-153A&B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.C2-3 (AP-63)	3.3.1-52	B
Heat Exchanger Components (CC-E-153A & B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	D
Heat Exchanger Components (CC-E-153A & B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.C2-3 (AP-63)	3.3.1-52	B
Heat Exchanger Components (CC-E-153A & B Tubesheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	D
Heat Exchanger Components (CC-E-153A & B Tubesheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	D

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Instrumentation Element	Pressure Boundary	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Instrumentation Element	Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B
Instrumentation Element	Pressure Boundary	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-8 (A-50)	3.3.1-85	B
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1 (A-09)	3.3.1-27	E, 5
Orifice	Pressure Boundary Throttle	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-4 (AP-12)	3.3.1-51	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-11 (S-10)	3.4.1-4	A A
Piping and Fittings	Pressure Boundary	Titanium	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 3
Piping and Fittings	Pressure Boundary	Titanium	Air With Borated Water Leakage (External)	None	None	None	None	F, 4

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Titanium	Raw Water (internal)	None	None	None	None	F, 3
Piping Element	Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Pressure Boundary	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 6
Piping Element	Pressure Boundary	Glass	Closed Cycle Cooling Water (Internal)	None	None	None	None	G, 6
Pump Casing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Pump Casing	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B
Tank	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Thermowell	Pressure Boundary	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	CASS	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1 (A-09)	3.3.1-27	E, 5
Valve Body	Pressure Boundary	CASS	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	V.F-3 EP-10)	3.2.1-53	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-4 (AP-12)	3.3.1-51	B
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-6 (AP-43)	3.3.1-84	B
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-8 (A-50)	3.3.1-85	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Nickel Alloy	Air-Indoor Uncontrolled (External)	None	None	VII.J-14 (AP-16)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 2
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Nickel Alloy	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	None	None	G
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1 (A-09)	3.3.1-27	E, 5
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B

Table 3.3.2-29

PRIMARY COMPONENT COOLING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.

2 NUREG-1801 does not include air with borated water leakage environment for nickel alloy components. Similar to V.F-13 for stainless steel, there are no aging effects for nickel alloy in air with borated water leakage. Additionally, the American Welding Society (AWS) “Welding Handbook,” (Seventh Edition, Volume 4, 1982, Library of Congress) identifies that nickel chromium alloy materials that are alloyed with iron, molybdenum, tungsten, cobalt or copper in various combinations have improved corrosion resistance.

3 Titanium materials located in air or water environments are not subject to aging effects. Titanium metal has superior resistance to general, pitting, crevice, and microbiologically influenced corrosion in both air and water environments due to a protective oxide film. The outstanding corrosion resistance of titanium and titanium alloys have been documented (Metals Handbook, Ninth Edition, Volume 13, “Corrosion”, American Society of Metals International). This is also consistent with plant operating experience.

4 NUREG-1801 does not include air with borated water leakage for titanium components. Similar to V.F-13 for stainless steel, there are no aging effects for titanium in air with borated water leakage.

5 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

6 This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air With Borated Water Leakage, Air Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.

7 NUREG-1801 specifies a plant-specific program for this line item. The Bolting Integrity Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-30

RADIATION MONITORING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Heat Exchanger Components (RM-E-127 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C

Table 3.3.2-30

RADIATION MONITORING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (RM-E-127 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (RM-E-127 Channel head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-27 (S-22)	3.4.1-16	A A
Heat Exchanger Components (RM-E-127 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (RM-E-127 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (RM-E-127 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VIII.F-1 (S-25)	3.4.1-25	B
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B

Table 3.3.2-30

RADIATION MONITORING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial) Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A

Table 3.3.2-30

RADIATION MONITORING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 2
Piping Element	Leakage Boundary (Spatial)	Glass	Closed Cycle Cooling Water (Internal)	None	None	None	None	G, 2
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Water (Internal)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-30

RADIATION MONITORING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial) Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Structural Integrity (Attached)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 1
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.J-15 stainless steel in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.
2	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.

Table 3.3.2-31

REACTOR MAKEUP WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Filter Housing	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Housing	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Filter Housing	Leakage Boundary (Spatial)	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Heater Housing	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heater Housing	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heater Housing	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-31

REACTOR MAKEUP WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Orifice	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Orifice	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Orifice	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Orifice	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-31

REACTOR MAKEUP WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 1
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Water (Internal)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-31

REACTOR MAKEUP WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A

Table 3.3.2-31

REACTOR MAKEUP WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-31

REACTOR MAKEUP WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.

Table 3.3.2-32

RELEASE RECOVERY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A

Table 3.3.2-32

RELEASE RECOVERY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A
Tank	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-32

RELEASE RECOVERY SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-33

RESIN SLUICING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-33

RESIN SLUICING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-34

ROOF DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 1
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-14 (A-51)	3.3.1-85	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

Table 3.3.2-34

ROOF DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 1

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies the Fire Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with rain/snow water from the roof drains. Therefore, the Fire Water System Program is not applicable to this environment.

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Heat Exchanger Components (SS-E-173, 174, 175, 176 and 184 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (SS-E-173, 174, 175, 176 and 184 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (SS-E-173, 174, 175, 176 and 184 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-4 (S-21)	3.4.1-16	A A
Heat Exchanger Components (SS-E-173, 174, 175, 176 and 184 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (SS-E-173, 174, 175, 176 and 184 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (SS-E-173, 174, 175, 176 and 184 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-4 (S-21)	3.4.1-16	A A
Heat Exchanger Components (SS-E-12A, 12B, 13A, 13B, 14A, 14B, 14C, 14D & 186 Channel Head)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (SS-E-12-A, 2B, 13A, 13B, 14A, 14B, 14C, 14D & 186 Channel Head)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (SS-E-12-A, 2B, 13A, 13B, 14A, 14B, 14C, 14D & 186 Channel Head)	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-1 (A-63)	3.3.1-48	B

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (SS-E-12A, 12B, 13A, 13B, 14A, 14B, 14C, 14D & 186 Shell)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (SS-E-12A, 12B, 13A, 13B, 14A, 14B, 14C, 14D & 186 Shell)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (SS-E-12A, 12B, 13A, 13B, 14A, 14B, 14C, 14D & 186 Shell)	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-1 (A-63)	3.3.1-48	B
Heater Housing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Heater Housing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Heater Housing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Instrumentation Element	Leakage Boundary (Spatial)	Polymer (Polycarbonate)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 1

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial)	Polymer (Polycarbonate)	Air With Borated Water Leakage (External)	None	None	None	None	F, 1
Instrumentation Element	Leakage Boundary (Spatial)	Polymer (Polycarbonate)	Treated Borated Water (Internal)	None	None	None	None	F, 1
Instrumentation Element	Leakage Boundary (Spatial)	Polymer (Polycarbonate)	Treated Water (Internal)	None	None	None	None	F, 1
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 2
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Water (Internal)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
Tank	Leakage Boundary (Spatial)	Polymer (Plastic)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 1
Tank	Leakage Boundary (Spatial)	Polymer (Plastic)	Air With Borated Water Leakage (External)	None	None	None	None	F, 1
Tank	Leakage Boundary (Spatial)	Polymer (Plastic)	Treated Water (Internal)	None	None	None	None	F, 1
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	C

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Trap	Leakage Boundary (Spatial)	Polymer (Polyolefin)	Air-Indoor Uncontrolled (External)	None	None	None	None	F, 1
Trap	Leakage Boundary (Spatial)	Polymer (Polyolefin)	Air With Borated Water Leakage (External)	None	None	None	None	F, 1
Trap	Leakage Boundary (Spatial)	Polymer (Polyolefin)	Treated Borated Water (Internal)	None	None	None	None	F, 1

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Trap	Leakage Boundary (Spatial)	Polymer (Polyolefin)	Treated Water (Internal)	None	None	None	None	F, 1
Valve Body	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial)	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-35

SAMPLE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Unlike metals, Polymers do not display corrosion rates. Rather than depending on an oxide layer for protection, they depend on chemical resistance to the environment to which they are exposed. The plastic is either completely resistant to the environment or it deteriorates. Therefore, acceptability for the use of Polymers within a given environment is a design driven criterion. Once the appropriate material is chosen, the system will have no aging effects. This is consistent with Plant operating experience.

2 This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.

Table 3.3.2-36

SCREEN WASH SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.F1-1 (A-09)	3.3.1-27	E, 2
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Condensation (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.D-1 (A-103)	3.3.1-44	A
Bolting	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 3
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C1-11 (A-51)	3.3.1-85	B
Filter Housing (Traveling Screen Housing)	Leakage Boundary (Spatial)	Fiberglass	Condensation (External)	None	None	None	None	F, 1

Table 3.3.2-36

SCREEN WASH SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing (Traveling Screen Housing)	Leakage Boundary (Spatial)	Fiberglass	Raw Water (Internal)	None	None	None	None	F, 1
Piping and Fittings	Leakage Boundary (Spatial)	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-14 (A-46)	3.3.1-25	E, 4
Piping and Fittings	Leakage Boundary (Spatial)	Copper Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-9 (A-44)	3.3.1-81	E, 5
Piping and Fittings	Leakage Boundary (Spatial)	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Piping and Fittings	Leakage Boundary (Spatial)	Nickel Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-13 (AP-53)	3.3.1-78	E, 5
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1 (A-09)	3.3.1-27	E, 4
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 5
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B

Table 3.3.2-36

SCREEN WASH SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 3
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 3
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C1-11 (A-51)	3.3.1-85	B
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-14 (A-46)	3.3.1-25	E, 4
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-9 (A-44)	3.3.1-81	E, 5
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.G-13 (A-47)	3.3.1-84	B
Valve Body	Leakage Boundary (Spatial)	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G

Table 3.3.2-36

SCREEN WASH SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Nickel Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-13 (AP-53)	3.3.1-78	E, 5
Valve Body	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 3

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Fiberglass components in condensation environment (external) and Raw Water environment (internal) are not exposed to high levels of ultraviolet radiation, high temperatures, or ozone, and therefore have no aging effects that require aging management. This is consistent with plant operating experience.
2	NUREG-1801 specifies a plant-specific program for this line item. The Bolting Integrity Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3 NUREG-1801 specifies the Fire Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with sea water for washing the traveling screens. Therefore, the Fire Water System Program is not applicable to this environment.

4 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

5 NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with sea water for washing the traveling screens. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

Table 3.3.2-37

SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	C
Bolting	Pressure Boundary	Copper Alloy >15% Zn	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.F4-12 (A-46)	3.3.1-25	E, 7
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Stainless Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.F1-1 (A-09)	3.3.1-27	E, 7
Bolting	Pressure Boundary	Stainless Steel	Raw Water (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Stainless Steel	Raw Water (External)	Loss of Material	Bolting Integrity Program	VII.C1-15 (A-54)	3.3.1-79	E, 6
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Bolting	Pressure Boundary	Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.D-1 (A-103)	3.3.1-44	A

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SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Expansion Joint	Leakage Boundary (Spatial) Pressure Boundary	Elastomer	Condensation (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Expansion Joint	Leakage Boundary (Spatial) Pressure Boundary	Elastomer	Raw Water (Internal)	Hardening and Loss of Strength	Open-Cycle Cooling Water System Program	VII.C1-1 (AP-75)	3.3.1-75	B
Expansion Joint	Leakage Boundary (Spatial) Pressure Boundary	Elastomer	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-2 (AP-76)	3.3.1-75	B
Expansion Joint	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 4
Expansion Joint	Pressure Boundary	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Expansion Joint	Pressure Boundary	Nickel Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-13 (AP-53)	3.3.1-78	B
Filter Element	Filter	Stainless Steel	Raw Water (External/Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-15 (A-54)	3.3.1-79	B
Filter Housing	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A

Table 3.3.2-37

SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Filter Housing	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-19 (A-38)	3.3.1-76	B
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-8 (AP-47)	3.3.1-26	B A
Instrumentation Element	Leakage Boundary (Spatial)	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 4
Instrumentation Element	Leakage Boundary (Spatial)	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Instrumentation Element	Leakage Boundary (Spatial)	Nickel Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-13 (AP-53)	3.3.1-78	B
Nozzle	Spray	Copper Alloy	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Nozzle	Spray	Copper Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-9 (A-44)	3.3.1-81	B

Table 3.3.2-37

SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Pressure Boundary Throttle	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Orifice	Pressure Boundary Throttle	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F4-12 (A-46)	3.3.1-25	E, 5
Orifice	Pressure Boundary Throttle	Copper Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-9 (A-44)	3.3.1-81	B
Orifice	Pressure Boundary Throttle	Nickel Alloy	Air With Borated Water Leakage (External)	None	None	None	None	G, 4
Orifice	Pressure Boundary Throttle	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Orifice	Pressure Boundary Throttle	Nickel Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-13 (AP-53)	3.3.1-78	B
Orifice	Pressure Boundary Throttle	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1 (A-09)	3.3.1-27	E, 5
Orifice	Pressure Boundary Throttle	Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-15 (A-54)	3.3.1-79	B

Table 3.3.2-37

SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F4-12 (A-46)	3.3.1-25	E, 5
Piping and Fittings	Structural Integrity (Attached)	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 3
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-9 (A-44)	3.3.1-81	B
Piping and Fittings	Pressure Boundary	Galvanized Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B

Table 3.3.2-37

SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Galvanized Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	B A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage	None	None	None	None	G, 4
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Nickel Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-13 (AP-53)	3.3.1-78	B
Piping and Fittings	Leakage Boundary (Spatial)	Polymer (PVC)	Condensation (External)	None	None	None	None	F, 1
Piping and Fittings	Leakage Boundary (Spatial)	Polymer (PVC)	Raw water (Internal)	None	None	None	None	F, 1
Piping and Fittings	Pressure Boundary	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1 (A-09)	3.3.1-27	E, 5

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SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-15 (A-54)	3.3.1-79	B
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Piping and Fittings	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Piping and Fittings	Pressure Boundary	Steel	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-19 (A-38)	3.3.1-76	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.C1-18 (A-01)	3.3.1-19	B

Table 3.3.2-37

SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-6 (SP-59)	3.4.1-30	B
Piping and Fittings	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	B A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-19 (A-38)	3.3.1-76	B
Piping Element	Pressure Boundary	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 2
Piping Element	Pressure Boundary	Glass	Air-Outdoor (External)	None	None	None	None	G, 2
Piping Element	Pressure Boundary	Glass	Condensation (External)	None	None	None	None	G, 2
Piping Element	Pressure Boundary	Glass	Lubricating Oil (Internal)	None	None	VII.J-10 (AP-15)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Raw Water (Internal)	None	None	VII.J-11 (AP-50)	3.3.1-93	A

Table 3.3.2-37

SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Pressure Boundary	CASS	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-15 (A-54)	3.3.1-79	B
Pump Casing	Pressure Boundary	CASS	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-15 (A-54)	3.3.1-79	B
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air indoor Uncontrolled	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Pressure Boundary	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1 (A-09)	3.3.1-27	E, 5
Pump Casing	Pressure Boundary	Stainless Steel	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-15 (A-54)	3.3.1-79	B
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.C1-15 (A-54)	3.3.1-79	E, 8
Pump Casing	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-15 (A-54)	3.3.1-79	B
Thermowell	Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage	None	None	None	None	G, 4
Thermowell	Pressure Boundary	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Thermowell	Pressure Boundary	Nickel Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-13 (AP-53)	3.3.1-78	B
Valve Body	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-37

SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	CASS	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1 (A-09)	3.3.1-27	E, 5
Valve Body	Pressure Boundary	CASS	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-15 (A-54)	3.3.1-79	B
Valve Body	Pressure Boundary	Copper Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F4-12 (A-46)	3.3.1-25	E, 5
Valve Body	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (Internal)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 3
Valve Body	Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-9 (A-44)	3.3.1-81	B
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy >15% Zn	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F4-12 (A-46)	3.3.1-25	E, 5

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SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-9 (A-44)	3.3.1-81	B
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Raw Water (External)	Loss of Material	Selective Leaching of Materials Program	VII.C1-10 (A-47)	3.3.1-84	B
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-8 (AP-47)	3.3.1-26	B A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-9 (A-44)	3.3.1-81	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C1-10 (A-47)	3.3.1-84	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Nickel Alloy	Air With Borated Water Leakage	None	None	None	None	G, 4

Table 3.3.2-37

SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Nickel Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-13 (AP-53)	3.3.1-78	B
Valve Body	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Valve Body	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Pressure Boundary	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	B
Valve Body	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-17 (AP-30)	3.3.1-14	B A

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SERVICE WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-19 (A-38)	3.3.1-76	B

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Unlike metals, Polymers do not display corrosion rates. Rather than depending on an oxide layer for protection, they depend on chemical resistance to the environment to which they are exposed. The plastic is either completely resistant to the environment or it deteriorates. Therefore, acceptability for the use of Polymers within a given environment is a design driven criterion. Once the appropriate material is chosen, the system will have no aging effects. This is consistent with Plant operating experience.

2	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.
3	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item V.F-3 copper alloy in an indoor uncontrolled air (External) environment exhibits no aging effect and that the component or structure will therefore remain capable of performing its intended functions consistent with the CLB for the period of extended operation.
4	NUREG-1801 does not include air with borated water leakage environment for nickel alloy components. Similar to V.F-13 for stainless steel, there are no aging effects for nickel alloy in air with borated water leakage. Additionally, the American Welding Society (AWS) “Welding Handbook,” (Seventh Edition, Volume 4, 1982, Library of Congress) identifies that nickel chromium alloy materials that are alloyed with iron, molybdenum, tungsten, cobalt or copper in various combinations have improved corrosion resistance.
5	NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.
6	NUREG-1801 specifies the Open-Cycle Cooling Water Program for this line item. The Bolting Integrity Program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. Since the component type is bolting, the Open Cycle Cooling Water System Program is not applicable.
7	NUREG-1801 specifies a plant-specific program for this line item. The Bolting Integrity Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.
8	NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with domestic water from the town of Seabrook. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

Table 3.3.2-38

SERVICE WATER PUMP HOUSE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Fire Barrier Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B
Damper Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Ducting Closure Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-4 (A-105)	3.3.1-55	B
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2 (A-10)	3.3.1-56	B

Table 3.3.2-38

SERVICE WATER PUMP HOUSE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Fan Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.A-19 (E-29)	3.2.1-32	D
Filter Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Filter Housing	Pressure Boundary	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F2-7 (A-17)	3.3.1-11	E, 1
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.F2-5 (A-73)	3.3.1-34	E, 1
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-7 (A-17)	3.3.1-11	E, 2
Flexible Connector	Pressure Boundary	Elastomer	Air-Indoor Uncontrolled (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-6 (A-18)	3.3.1-34	E, 2
Screen	Filter	Galvanized Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-6 (AP-13)	3.3.1-92	C

Table 3.3.2-38

SERVICE WATER PUMP HOUSE AIR HANDLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Screen	Filter	Galvanized Steel	Air-Indoor Uncontrolled (Internal)	None	None	VII.J-6 (AP-13)	3.3.1-92	C

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

2 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-39

SPENT FUEL POOL COOLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Stainless Steel	Treated Borated Water (External)	Loss of Material	Bolting Integrity Program	VII.A3-8 (AP-79)	3.3.1-91	E, 2
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII. I-2 (A-102)	3.3.1-89	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A

Table 3.3.2-39

SPENT FUEL POOL COOLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air-Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	VII.F2-7 (A-17)	3.3.1-11	E, 3
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air With Borated Water Leakage (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial)	Elastomer	Air-Indoor Uncontrolled (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.F2-7 (A-17)	3.3.1-11	E, 4
Heat Exchanger Components (SF-E15A & B Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Heat Exchanger Components (SF-E-15A & B Channel Head)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (SF-E-15A & B Channel Head)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	C
Heat Exchanger Components (SF-E-15A & B Channel Head Cover)	Pressure Boundary	Steel With Stainless Steel Cladding	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (SF-E-15A & B Channel Head Cover)	Pressure Boundary	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.A3-2 (A-79)	3.3.1-89	A

Table 3.3.2-39

SPENT FUEL POOL COOLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (SF-E-15A & B Channel Head Cover)	Pressure Boundary	Steel With Stainless Steel Cladding	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	C
Heat Exchanger Components (SF-E-15A & B Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (SF-E-15A & B Shell)	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.A3-2 (A-79)	3.3.1-89	A
Heat Exchanger Components (SF-E-15A & B Shell)	Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.A3-3 (A-63)	3.3.1-48	B
Heat Exchanger Components (SF-E-15A & B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.A-7 (E-19)	3.2.1-28	B
Heat Exchanger Components (SF-E-15A & B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System Program	VII.C2-3 (AP-63)	3.3.1-52	B
Heat Exchanger Components (SF-E-15A & B Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	C
Heat Exchanger Components (SF-E-15A & B Tubesheet)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System Program	V.A-7 (E-19)	3.2.1-28	B

Table 3.3.2-39

SPENT FUEL POOL COOLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (SF-E-15A & B Tubesheet)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	C
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air W/ Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-39

SPENT FUEL POOL COOLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.A3-2 (A-79)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (External)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Piping Element	Leakage Boundary (Spatial)	Glass	Air With Borated Water Leakage (External)	None	None	None	None	G, 1

Table 3.3.2-39

SPENT FUEL POOL COOLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Borated Water (Internal)	None	None	VII.J-12 (AP-52)	3.3.1-93	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	C

Table 3.3.2-39

SPENT FUEL POOL COOLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-39

SPENT FUEL POOL COOLING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.A3-8 (AP-79)	3.3.1-91	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	This environment is not in NUREG-1801 for this component and material. There are no aging effects for glass in Air with Borated Water Leakage, Air-Outdoor, Closed-Cycle Cooling Water, Condensation or Gas environments based on other NUREG-1801 items for glass, such as VII.J-11 in Raw Water environment and VII.J-12 for glass in treated borated water environment.
2	NUREG-1801 specifies the Water Chemistry Program for this line item. The Bolting Integrity Program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. Since the component type is bolting, The Water Chemistry Program is not applicable.

3 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

4 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-40

SWITCHYARD

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Aluminum	Air-Outdoor (External)	Loss of Material	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Aluminum	Air-Outdoor (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Material	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	Bolting Integrity Program	VII.I-1 (AP-28)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Expansion Joint	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Expansion Joint	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Filter Housing	Pressure Boundary	Copper Alloy >15% Zn	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G

Table 3.3.2-40

SWITCHYARD

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-10 (AP-47)	3.3.1-26	B A
Filter Housing	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Filter Housing	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.C1-14 (AP-59)	3.3.1-33	B A
Filter Housing	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Piping and Fittings	Pressure Boundary	Aluminum	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Piping and Fittings	Pressure Boundary	Aluminum	Gas (Internal)	None	None	VII.J-2 (AP-37)	3.3.1-97	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Piping and Fittings	Pressure Boundary	Copper Alloy	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VII.H2-10 (AP-47)	3.3.1-26	B A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G

Table 3.3.2-40

SWITCHYARD

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Piping and Fittings	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Piping and Fittings	Pressure Boundary	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
Rupture Disc	Pressure Boundary	Nickel Alloy	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Rupture Disc	Pressure Boundary	Nickel Alloy	Gas (Internal)	None	None	None	None	G, 1
Valve Body	Pressure Boundary	Aluminum	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	F
Valve Body	Pressure Boundary	Aluminum	Gas (Internal)	None	None	VII.J-2 (AP-37)	3.3.1-97	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Gas (Internal)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
Valve Body	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A

Table 3.3.2-40

SWITCHYARD

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VII.H1-8 (A-24)	3.3.1-60	B
Valve Body	Pressure Boundary	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 does not include gas environment for nickel alloy components. Similar to VII.J-19 for stainless steel in Gas environment, there are no aging effects for nickel alloy in gas environment.

Table 3.3.2-41

VALVE STEM LEAK-OFF SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water >140 °F (Internal)	Cracking	Water Chemistry Program	VII.E1-20 (AP-82)	3.3.1-90	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-42

VENT GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.D-4 (AP-81)	3.3.1-54	E, 1
Piping and Fittings	Structural Integrity (Attached)	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (AP-18)	3.2.1-57	A
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Gas	None	None	V.F-15 (AP-18)	3.2.1-56	A

Table 3.3.2-42

VENT GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.D-4 (AP-81)	3.3.1-54	E, 1
Trap	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Trap	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Trap	Leakage Boundary (Spatial)	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.D-4 (AP-81)	3.3.1-54	E, 1
Valve Body	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-42

VENT GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	CASS	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.D-4 (AP-81)	3.3.1-54	E, 1
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Structural Integrity (Attached)	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	V.F-13 (AP-18)	3.2.1-57	A
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Gas	None	None	V.F-15 (AP-18)	3.2.1-56	A

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies the Compressed Air Monitoring Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The Vent Gas system is associated with air with radioactive contaminants or hydrogenated gas or reactor coolant vent gas environment. Therefore, the Compressed Air Monitoring Program is not applicable to this environment.

Table 3.3.2-43

WASTE GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Pressure Boundary	Steel	Air W/ Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air W/ Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Piping and Fittings	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-43

WASTE GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Structural Integrity (Attached)	Steel	Air W/ Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Structural Integrity (Attached)	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Air W/ Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary Structural Integrity (Attached)	Stainless Steel	Gas (Internal)	None	None	VII.J-19 (AP-22)	3.3.1-97	A

Table 3.3.2-43

WASTE GAS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Structural Integrity (Attached)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Structural Integrity (Attached)	Steel	Air W/ Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Structural Integrity (Attached)	Steel	Gas (Internal)	None	None	VII.J-23 (AP-6)	3.3.1-97	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.3.2-44

WASTE PROCESSING LIQUID SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.D-1 (A-103)	3.3.1-44	A
Bolting	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	E, 1, 2
Flexible Hose	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 3
Heater Housing	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heater Housing	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heater Housing	Leakage Boundary (Spatial)	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	A A

Table 3.3.2-44

WASTE PROCESSING LIQUID SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 3
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 4
Tank	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C

Table 3.3.2-44

WASTE PROCESSING LIQUID SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 3
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 3
Valve Body	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	CASS	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	E, 1, 2
Valve Body	Leakage Boundary (Spatial)	CASS	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 3

Table 3.3.2-44

WASTE PROCESSING LIQUID SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.F1-16 (A-46)	3.3.1-25	E, 5
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-11 (AP-45)	3.3.1-80	E, 3
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.H2-13 (A-47)	3.3.1-84	B
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.D-4 (AP-81)	3.3.1-54	E, 1, 2
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.H2-18 (AP-55)	3.3.1-80	E, 3
Valve Body	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-11 (A-81)	3.3.1-58	B

Table 3.3.2-44

WASTE PROCESSING LIQUID SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 4

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	Components having the same internal/external environments have the same aging effects on both internal/external surfaces. As shown in NUREG-1801 Vol. 2 line item VII.D-4 stainless steel in a condensation (Internal) environment exhibits loss of material due to pitting and crevice corrosion. Therefore, stainless steel in a condensation (External) environment will exhibit the same aging effects/mechanisms.

2 NUREG-1801 specifies the Compressed Air Monitoring Program for this line item. The External Surfaces Monitoring Program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The system that is associated with this line item is Waste Processing Liquid System that has an internal environment of radioactive liquid waste and an external environment of condensation. Therefore, the Compressed Air Monitoring Program is not applicable to this environment.

3 NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with radioactive liquid waste. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

4 NUREG-1801 specifies the Fire Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with radioactive liquid waste. Therefore, the Fire Water System Program is not applicable to this environment.

5 NUREG-1801 specifies a plant-specific program for this line item. The External Surfaces Monitoring Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VII.I-4 (AP-27)	3.3.1-43	A
Bolting	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VII.I-5 (AP-26)	3.3.1-45	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-2 (A-102)	3.3.1-89	A
Filter Housing	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Filter Housing	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Filter Housing	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-19 (A-55)	3.3.1-69	E, 1
Filter Housing	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Filter Housing	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B
Heat Exchanger Components (WLD-E-43 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Heat Exchanger Components (WLD-E-43 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (WLD-E-43 Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Heat Exchanger Components (WLD-E-43 Shell)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Heat Exchanger Components (WLD-E-43 Shell)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Heat Exchanger Components (WLD-E-43 Shell)	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-1 (A-63)	3.3.1-48	B
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Stainless Steel	Air-Indoor Uncontrolled (External)	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Stainless Steel	Air With Borated Water Leakage (External)	None	VII.J-16 (AP-18)	3.3.1-99	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-19 (A-55)	3.3.1-69	E, 1
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Stainless Steel	Concrete	None	None	VII.J-17 (AP-19)	3.3.1-96	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-19 (A-55)	3.3.1-69	E, 1
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Piping and Fittings	Pressure Boundary	Steel	Concrete	None	None	VII.J-21 (AP-3)	3.3.1-96	A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-24 (A-33)	3.3.1-68	E, 1
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.C-3 (E-34)	3.2.1-38	E, 2
Piping and Fittings (Containment Isolation)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VII.C2-8 (A-50)	3.3.1-85	B
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-19 (A-55)	3.3.1-69	E, 1
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Tank	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	C
Tank	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Tank	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Tank	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	CASS	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B
Valve Body	Pressure Boundary	CASS	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-19 (A-55)	3.3.1-69	E, 1
Valve Body	Leakage Boundary (Spatial)	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-10 (A-52)	3.3.1-50	B

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.G-19 (A-55)	3.3.1-69	E, 1
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VII.I-8 (A-77)	3.3.1-58	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-10 (A-79)	3.3.1-89	A
Valve Body	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B
Valve Body (Containment Isolation)	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body (Containment Isolation)	Pressure Boundary	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body (Containment Isolation)	Pressure Boundary	CASS	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.C-3 (E-34)	3.2.1-38	E, 2

Table 3.3.2-45

WASTE PROCESSING LIQUID DRAINS SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body (Containment Isolation)	Pressure Boundary	CASS	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	V.C-3 (E-34)	3.2.1-38	E, 2
Valve Body (Containment Isolation)	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies the Fire Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with radioactive liquid waste drainage. Therefore, the Fire Water System Program is not applicable to this environment.

2 NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with radioactive liquid waste drainage. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEMS

3.4.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.4, Steam and Power Conversion Systems, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- Auxiliary Steam System (2.3.4.1)
- Auxiliary Steam Condensate System (2.3.4.2)
- Auxiliary Steam Heating System (2.3.4.3)
- Circulating Water System (2.3.4.4)
- Condensate System (2.3.4.5)
- Feedwater System (2.3.4.6). Feedwater system includes the Emergency Feedwater System which is the same system as Auxiliary Feedwater System in VII.G of NUREG-1801, Vol. 2, Rev. 1.
- Main Steam System (2.3.4.7)
- Steam Generator Blowdown System (2.3.4.8)

3.4.2 RESULTS

The following tables summarize the results of the aging management review for the Steam and Power Conversion Systems.

Table 3.4.2-1	Summary of Aging Management Evaluation – Auxiliary Steam System
Table 3.4.2-2	Summary of Aging Management Evaluation – Auxiliary Steam Condensate System
Table 3.4.2-3	Summary of Aging Management Evaluation – Auxiliary Steam Heating System
Table 3.4.2-4	Summary of Aging Management Evaluation – Circulating Water System
Table 3.4.2-5	Summary of Aging Management Evaluation – Condensate System
Table 3.4.2-6	Summary of Aging Management Evaluation – Feedwater System
Table 3.4.2-7	Summary of Aging Management Evaluation – Main Steam System

Table 3.4.2-8 Summary of Aging Management Evaluation – Steam Generator Blowdown

3.4.2.1 Materials, Environments, Aging Effects Requiring Management and Aging Managements Programs

3.4.2.1.1 Auxiliary Steam System

Materials

The materials of construction for the Auxiliary Steam System components requiring aging management review are:

- Copper Alloy >15% Zn
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Auxiliary Steam System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Raw Water
- Steam
- Treated Borated Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Steam System components and commodities require management:

- Cracking
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Steam System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)

- External Surfaces Monitoring Program (B.2.1.24)
- Flow-Accelerated Corrosion Program (B.2.1.8)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- One-Time Inspection Program (B.2.1.20)
- Selective Leaching of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.4.2-1, Summary of Aging Management Evaluation – Auxiliary Steam System, summarizes the results of the aging management review for the Auxiliary Steam System.

3.4.2.1.2 Auxiliary Steam Condensate System

Materials

The materials of construction for the Auxiliary Steam Condensate System components requiring aging management review are:

- Copper Alloy
- Copper Alloy >15% Zn
- Glass
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Auxiliary Steam Condensate System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Air with Borated Water Leakage
- Raw Water
- Treated Water
- Treated Water >140°F

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Steam Condensate System components and commodities require management:

- Cracking
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Steam Condensate System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Flow-Accelerated Corrosion Program (B.2.1.8)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- One-Time Inspection Program (B.2.1.20)
- Selective Leaching of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.4.2-2, Summary of Aging Management Evaluation – Auxiliary Steam Condensate System, summarizes the results of the aging management review for the Auxiliary Steam Condensate System.

3.4.2.1.3 Auxiliary Steam Heating System

Materials

The materials of construction for the Auxiliary Steam Heating System components requiring aging management review are:

- Aluminum
- Copper Alloy
- Copper Alloy >15% Zn
- Glass
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Auxiliary Steam Heating System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Raw Water
- Steam

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Steam Heating System components and commodities require management:

- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer
- Wall Thinning

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Steam Heating System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.25)
- Flow-Accelerated Corrosion Program (B.2.1.8)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.24)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.4.2-3, Summary of Aging Management Evaluation – Auxiliary Steam Heating System, summarizes the results of the aging management review for the Auxiliary Steam Heating System.

3.4.2.1.4 Circulating Water System

Materials

The materials of construction for the Circulating Water System components requiring aging management review are:

- Copper Alloy >15% Zn
- Elastomer
- Gray Cast Iron
- Nickel Alloy
- Steel

Environments

Components of the Circulating Water System are exposed to the following environments:

- Condensation
- Raw Water

Aging Effects Requiring Management

The following aging effects associated with the Circulating Water System components and commodities require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Circulating Water System components:

- Bolting Integrity Program (B.2.1.9)
- External Surfaces Monitoring Program (B.2.1.24)
- Open-Cycle Cooling Water System Program (B.2.1.11)
- Selective Leaching of Materials Program (B.2.1.21)

Summary of Aging Management Review Results

Table 3.4.2-4, Summary of Aging Management Evaluation – Circulating Water System, summarizes the results of the aging management review for the Circulating Water System.

3.4.2.1.5 Condensate System

Materials

The materials of construction for the Condensate System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Copper Alloy

- Glass
- Stainless Steel
- Steel

Environments

Components of the Condensate System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Concrete
- Soil
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Condensate System components and commodities require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Condensate System components:

- Bolting Integrity Program (B.2.1.9)
- Buried Piping and Tanks Inspection Program (B.2.1.22)
- External Surfaces Monitoring Program (B.2.1.24)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.4.2-5, Summary of Aging Management Evaluation – Condensate System, summarizes the results of the aging management review for the Condensate System.

3.4.2.1.6 Feedwater System

Materials

The materials of construction for the Feedwater System components requiring aging management review are:

- Aluminum
- Cast Austenitic Stainless Steel/CASS
- Copper Alloy >15% Zn
- Glass
- Gray Cast Iron
- Stainless Steel
- Steel

Environments

Components of the Feedwater System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Gas
- Lubricating Oil
- Steam
- Treated Water
- Treated Water >140°F

Aging Effects Requiring Management

The following aging effects associated with the Feedwater System components and commodities require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer
- Wall Thinning

Aging Management Programs

The following programs manage the aging effects requiring management for the Feedwater System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Flow-Accelerated Corrosion Program (B.2.1.8)
- Lubricating Oil Analysis Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.20)
- Selective Leaching of Materials Program (B.2.1.21)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.4.2-6, Summary of Aging Management Evaluation – Feedwater System, summarizes the results of the aging management review for the Feedwater System.

3.4.2.1.7 Main Steam System (Includes Main Steam Drains System)

Materials

The materials of construction for the Main Steam System components requiring aging management review are:

- Aluminum
- Glass
- Stainless Steel
- Steel

Environments

Components of the Main Steam System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air-Outdoor
- Air with Borated Water Leakage
- Condensation
- Gas
- Lubricating Oil

- Steam
- Treated Water
- Treated Water >140° F

Aging Effects Requiring Management

The following aging effects associated with the Main Steam System components and commodities require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following programs manage the aging effects requiring management for the Main Steam System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- External Surfaces Monitoring Program (B.2.1.24)
- Flow-Accelerated Corrosion Program (B.2.1.8)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B.2.1.25)
- Lubricating Oil Analysis Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.4.2-7, Summary of Aging Management Evaluation – Main Steam System, summarizes the results of the aging management review for the Main Steam System.

3.4.2.1.8 Steam Generator Blowdown System

Materials

The materials of construction for the Steam Generator Blowdown System components requiring aging management review are:

- Cast Austenitic Stainless Steel/CASS
- Stainless Steel

- Steel
- Steel with Stainless Steel Cladding

Environments

Components of the Steam Generator Blowdown System are exposed to the following environments:

- Air-Indoor Uncontrolled
- Air with Borated Water Leakage
- Closed Cycle Cooling Water
- Treated Water
- Treated Water >140°F

Aging Effects Requiring Management

The following aging effects associated with the Steam Generator Blowdown System components and commodities require management:

- Cracking
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following programs manage the aging effects requiring management for the Steam Generator Blowdown System components:

- Bolting Integrity Program (B.2.1.9)
- Boric Acid Corrosion Program (B.2.1.4)
- Closed-Cycle Cooling Water Program (B.2.1.12)
- External Surfaces Monitoring Program (B.2.1.24)
- Flow-Accelerated Corrosion Program (B.2.1.8)
- One-Time Inspection Program (B.2.1.20)
- Water Chemistry Program (B.2.1.2)

Summary of Aging Management Review Results

Table 3.4.2-8, Summary of Aging Management Evaluation – Steam Generator Blowdown System, summarizes the results of the aging management review for the Steam Generator Blowdown System.

3.4.2.2 AMR Results for Which Further Evaluation is Recommended by NUREG-1801

NUREG-1800 indicates that further evaluation is necessary for certain aging effects, particularly those that require plant specific programs. Section 3.0 of NUREG-1800 discusses these aging effects that require further evaluation. The following sections are numbered in accordance with the discussions in Section 3.0 of NUREG-1800 and explain Seabrook Station's approach to these areas requiring further evaluation.

3.4.2.2.1 Cumulative Fatigue Damage

Fatigue is 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). This TLAA is addressed separately in Section 4.3, "Metal Fatigue Analysis," of this SRP-LR.

At Seabrook Station, the evaluation of metal fatigue as a TLAA for the Feedwater and Main Steam systems is discussed in Section 4.3.

3.4.2.2.2 Loss of Material due to General, Pitting, and Crevice Corrosion

1. *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. The existing aging management program relies on monitoring and control of water chemistry to manage the effects of loss of material due to general, pitting, and crevice corrosion. However, control of water chemistry does not preclude loss of material due to general, pitting, and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of the water chemistry control program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage the loss of material due to general, pitting, and crevice corrosion in steel piping components exposed to steam in the Auxiliary Steam, Boron Recovery, Nitrogen Gas, Waste Processing Liquid systems. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage the loss of material due to general, pitting, and crevice corrosion in steel heat exchanger components exposed to steam in the Chemical and Volume Control, and Hot Water Heating, and Fire Protection systems. The Water Chemistry and One-Time Inspection Programs are described in Appendix B.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage the loss of material due to general, pitting, and crevice corrosion in steel piping components exposed to treated water in the Auxiliary Steam, Auxiliary Steam Condensate, Chemical and Volume Control Condensate, Demineralized Water, Feedwater, Hot Water Heating, Primary Component Cooing Water, Reactor Make-Up Water, Release Recovery, Sample, and Steam Generator Blowdown systems. The Water Chemistry and One-Time Inspection Programs are described in Appendix B.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage the loss of material due to general, pitting, and crevice corrosion in steel tanks exposed to treated water in the Auxiliary Steam Condensate, Fuel Handling, Hot Water Heating, Release Recovery, and Steam Generator Blowdown systems. The Water Chemistry and One-Time Inspection Programs are described in Appendix B.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage the loss of material due to general, pitting, and crevice corrosion in steel heat exchanger components exposed to treated water in the Condensate and Hot Water Heating systems. The Water Chemistry and One-Time Inspection Programs are described in Appendix B.

2. *Loss of material due to general, pitting and crevice corrosion could occur for steel piping, piping components, and piping elements exposed to lubricating oil. The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil contaminant control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lube oil chemistry control program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

Seabrook Station will implement the One-Time Inspection program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis program, B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion in steel piping components and steel tanks exposed to lubricating oil in the Feedwater and Main Steam systems. The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

3.4.2.2.3 Loss of Material due to General, Pitting, Crevice Corrosion, 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. The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

Seabrook Station will implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program, B.2.1.25, to manage loss of material due to pitting, crevice, galvanic (an additional aging mechanism in the Auxiliary Steam Condensate system), and microbiologically influenced corrosion in steel piping components in the Auxiliary Steam Condensate and Auxiliary Steam Heating systems and steel tanks in the Auxiliary Steam Condensate and Auxiliary Steam Heating systems exposed to raw water (fouling was excluded as an aging mechanism since the raw water in these systems is associated with potable water, which is domestic water from the town of Seabrook).The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is described in Appendix B.

3.4.2.2.4 Reduction of Heat Transfer due to Fouling

1. *Reduction of heat transfer due to fouling could occur for stainless steel and copper alloy heat exchanger tubes exposed to treated water. The existing aging management program relies on control of water chemistry to manage reduction of heat transfer due to fouling. However, control of water chemistry may not always have been adequate to preclude fouling. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure that reduction of heat transfer due to fouling is not occurring. A one-time inspection is an acceptable method to ensure that reduction of heat transfer is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage reduction of heat transfer due to fouling in stainless steel heat exchanger tubes exposed to treated water in the Feedwater system. The One-Time Inspection and Water Chemistry programs are described in Appendix B.

2. *Reduction of heat transfer due to fouling could occur for steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil. The existing aging management program relies on monitoring and control of lube oil chemistry to mitigate reduction of heat transfer due to fouling. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil contaminant control should be verified to ensure that fouling is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of lube oil chemistry control program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage reduction of heat transfer due to fouling in stainless steel heat exchanger tubes exposed to lubricating oil in the Feedwater System. The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

3.4.2.2.5 Loss of Material due to General, Pitting, Crevice Corrosion, and Microbiologically-Influenced Corrosion

1. *Loss of material due to general, pitting and crevice corrosion, and MIC could occur in steel (with or without coating or wrapping) piping, piping components, piping elements and tanks exposed to soil. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general corrosion, pitting and crevice corrosion, and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.*

   Seabrook Station will implement the Buried Piping and Tanks Inspection Program, B.2.1.22, to manage loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion (MIC) in steel piping components exposed to soil in the Condensate system. The Buried Piping and Tanks Inspection Program is described in Appendix B.

2. *Loss of material due to general, pitting and crevice corrosion, and MIC could occur in steel heat exchanger components exposed to lubricating oil. The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within*

acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil contaminant control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lube oil chemistry control program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Item Number 3.4.1-12 is not applicable at Seabrook Station. There are no steel heat exchanger components exposed to lubricating oil in the systems that make up the Steam and Power Conversion Systems.

3.4.2.2.6 Cracking due to Stress Corrosion Cracking (SCC)

Cracking due to SCC could occur in the stainless steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to treated water greater than 60°C (>140°F), and for stainless steel piping, piping components, and piping elements exposed to steam. The existing aging management program relies on monitoring and control of water chemistry to manage the effects of cracking due to SCC. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause SCC. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure that SCC is not occurring. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that SCC is not occurring and that the component's intended function will be maintained during the period of extended operation.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage cracking due to stress corrosion cracking in stainless steel piping components exposed to treated water >140°F in the Auxiliary Steam Condensate, Feedwater, Hot Water Heating, Main Steam, and Steam Generator Blowdown systems. The One-Time Inspection and Water Chemistry Programs are described in Appendix B.

Item Number 3.4.1-13 is applicable to BWRs only. This item number is not used by Seabrook Station.

3.4.2.2.7 Loss of Material due to Pitting and Crevice Corrosion

1. *Loss of material due to pitting and crevice corrosion could occur for stainless steel, aluminum, and copper alloy piping, piping components and piping elements and for stainless steel tanks and heat exchanger components exposed to treated water. The existing aging management*

program relies on monitoring and control of water chemistry to manage the effects of loss of material due to pitting, and crevice corrosion. However, control of water chemistry does not preclude corrosion at locations of stagnant flow conditions. Therefore, the GALL Report recommends that the effectiveness of the water chemistry program should be verified to ensure that corrosion is not occurring. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to pitting and crevice corrosion in the stainless steel piping components exposed to treated water in the Auxiliary Steam, Auxiliary Steam Condensate, Chemical and Volume Control System, Condensate, Demineralized Water, Feedwater, Fuel Handling, Hot Water Heating, Main Steam, Mechanical Seal Supply, Radiation Monitoring, Reactor Coolant, Reactor Makeup Water, Release Recovery , Sample, and Steam Generator Blowdown systems, and stainless steel heat exchanger components exposed to treated water in the Condensate, Feedwater, Mechanical Seal Supply, Radiation Monitoring, Sample, and Steam Generator Blowdown systems, and stainless steel tanks exposed to treated water in the Chemical and Volume Control, Condensate, Containment Building Spray, Mechanical Seal Supply, Reactor Coolant, Reactor Makeup Water, and Sample systems. The One-Time Inspection and Water Chemistry Programs are described in Appendix B.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to pitting and crevice corrosion in the copper alloy piping components exposed to treated water in the Auxiliary Steam Condensate, Condensate, Demineralized Water, Fuel Handling, and Hot Water Heating systems. In addition, galvanic corrosion is an additional aging mechanism that will be managed in the Demineralized Water and Fuel Handling systems. The One-Time Inspection and Water Chemistry Programs are described in Appendix B.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to pitting and crevice corrosion in the copper alloy heat exchanger components exposed to treated water in the Feedwater system. The One-Time Inspection and Water Chemistry Programs are described in Appendix B.

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to pitting and crevice corrosion in the copper alloy heater coils exposed to treated water in the Hot Water Heating System. The One-Time Inspection and Water Chemistry Programs are described in Appendix B.

2. *Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements exposed to soil. The GALL Report recommends further evaluation of a plant-specific aging management to ensure that this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB- 1 .*

   Seabrook Station will implement the Buried Piping and Tanks Inspection Program, B.2.1.22, to manage loss of material due to pitting, crevice, and in addition microbiologically-influenced corrosion (MIC) in stainless steel piping components exposed to soil in the Condensate system. The Buried Piping and Tanks Inspection Program is described in Appendix B.

3. *Loss of material due to pitting and crevice corrosion could occur for copper alloy piping, piping components, and piping elements exposed to lubricating oil. The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil contaminant control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lube oil chemistry control program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to pitting and crevice corrosion in copper alloy piping components and copper alloy heat exchanger components exposed to lubricating oil in the Feedwater system. The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

3.4.2.2.8 Loss of Material due to Pitting, Crevice, and Microbiologically-Influenced Corrosion

Loss of material due to pitting, crevice, and MIC could occur in stainless steel piping, piping components, piping elements, and heat exchanger components exposed to lubricating oil. The existing aging management program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants *within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to preclude corrosion. Therefore, the effectiveness of lubricating oil contaminant control should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the lube oil chemistry control program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

Seabrook Station will implement the One-Time Inspection Program, B.2.1.20, to verify the effectiveness of the Lubricating Oil Analysis Program, B.2.1.26, to manage loss of material due to pitting, crevice, and microbiologically-influenced corrosion (MIC) in stainless steel piping components exposed to lubricating oil in the Feedwater and Main Steam systems, and stainless steel heat exchanger components exposed to lubricating oil in the Feedwater system, and stainless steel tank exposed to lubricating oil in the Main Steam system. The Lubricating Oil Analysis and One-Time Inspection Programs are described in Appendix B.

3.4.2.2.9 Loss of Material due to General, Pitting, Crevice, and Galvanic Corrosion

Loss of material due to general, pitting, crevice, and galvanic corrosion can occur for steel heat exchanger components exposed to treated water. The existing aging management program relies on monitoring and control of water chemistry to manage the effects of loss of material due to general, pitting, and crevice corrosion. However, control of water chemistry does not preclude loss of material due to general, pitting, and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to verify the effectiveness of the water chemistry control program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Item Number 3.4.1-5 is not applicable at Seabrook Station. There are no steel heat exchanger components exposed to treated water in the systems that make up the Steam and Power Conversion Systems.

3.4.2.2.10 Quality Assurance for Aging Management of Nonsafety-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 identified below are associated with the Steam and Power Conversion System components:

- Section 4.3, Metal Fatigue of Piping and Components

3.4.3 CONCLUSION

The Steam and Power Conversion system piping and components subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B. These activities demonstrate that the aging effects associated with the Steam and Power Conversion Systems will be adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-1	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 is a TLAA; further evaluation is documented in Subsection 3.4.2.2.1.
3.4.1-2	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	Components in the Boron Recovery, Chemical and Volume Control, Containment Building Spray, Fire Protection, Hot Water, Nitrogen Gas, and Waste Processing Liquid systems have been aligned with this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to general, pitting, and crevice corrosion in steel piping components and steel heat exchanger components exposed to steam. a) Steel piping components are contained in the Auxiliary Steam, Boron Recovery, Containment Building Spray, , Hot Water, Nitrogen Gas, and Waste Processing Liquid systems. a) Steel heat exchanger components are contained in the Chemical and Volume Control, Fire Protection, and Hot Water Heating systems. See Subsection 3.4.2.2.2.1.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-3	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	Components in the Hot Water system have been aligned with this line number based on material, environment, and aging effect. Consistent with NUREG-1801. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to general, pitting, and crevice corrosion in steel heat exchanger components exposed to treated water in the Condensate and Hot Water Heating, systems. See Subsection 3.4.2.2.2.1.
3.4.1-4	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	Components in the Chemical and Volume Control, Demineralized Water, Hot Water Heating, Primary Component Cooling Water, Reactor Make-Up Water, Release Recovery, and Sample systems have been aligned with this line number based on material, environment, and aging effect. Consistent with NUREG-1801. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2 to manage loss of material due to general, pitting, and crevice corrosion in steel piping components exposed to treated water in the Auxiliary Steam, Auxiliary Steam Condensate, Chemical and Volume Control, Condensate, Demineralized Water, Feedwater, Hot Water Heating, Primary Component Cooling Water, Reactor Make-Up Water, Release Recovery, Sample, and Steam Generator Blowdown systems. See Subsection 3.4.2.2.2.1.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-5	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	Not Applicable. The Steam and Power Conversion Systems have no steel heat exchanger components exposed to treated water. See Subsection 3.4.2.2.9.
3.4.1-6	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	Components in the Chemical and Volume Control, Containment Building Spray, Fuel Handling, Hot Water Heating, Mechanical Seal Supply, Reactor Coolant, Reactor Make-Up Water, Release Recovery, and Sample systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to general, pitting, and crevice corrosion in steel tanks exposed to treated water in the Auxiliary Steam Condensate, Fuel Handling, Hot Water Heating, Release Recovery, and Steam Generator Blowdown systems, and to manage pitting and crevice corrosion in the stainless steel tanks exposed to treated water in the Chemical and Volume Control, Containment Building Spray, Condensate, Mechanical Seal Supply, Reactor Coolant, Reactor Make-Up Water, and Sample systems. See Subsection 3.4.2.2.2.1 for steel tanks and Subsection 3.4.2.2.7.1 for stainless steel tanks.
3.4.1-7	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 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion in steel piping components exposed to lubricating oil in the Feedwater and Main Steam systems, and steel tanks exposed to lubricating oil in the Feedwater and Main Steam systems. See Subsection 3.4.2.2.2.2.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-8	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	Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to pitting, crevice, galvanic (an additional aging mechanism in the Auxiliary Steam Condensate system), and microbiologically influenced corrosion in steel piping components and steel tanks exposed to raw water in the Auxiliary Steam Condensate and Auxiliary Steam Heating systems (fouling was excluded as an aging mechanism since the raw water in these systems is associated with potable water, which is domestic water from the town of Seabrook). See Subsection 3.4.2.2.3.
3.4.1-9	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. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage reduction of heat transfer due to fouling in stainless steel heat exchanger tubes exposed to treated water in the Feedwater system. See 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 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage reduction of heat transfer due to fouling in stainless steel heat exchanger tubes exposed to lubricating oil in the Feedwater system. See Subsection 3.4.2.2.4.2.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Consistent with NUREG-1801 with exceptions. The Buried Piping and Tanks Inspection Program (with exceptions), B.2.1.22, will be used to manage loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion in steel piping components exposed to soil in the Condensate system. See 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 microbiologically influenced corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Not Applicable. The Steam and Power Conversion Systems have no steel heat exchanger components exposed to lubricating oil. See Subsection 3.4.2.2.5.2.
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	Components in Hot Water Heating system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage cracking due to stress corrosion cracking in stainless steel piping components exposed to treated water >140^0F in the Auxiliary Steam Condensate, Feedwater, Hot Water Heating, Main Steam, and Steam Generator Blowdown systems. See Subsection 3.4.2.2.6.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Components in Demineriliz\u200ced Water, Fuel Handling, and Hot Water Heating systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2, to manage loss of material due to pitting and crevice corrosion in the copper alloy piping components exposed to treated water in the Auxiliary Steam Condensate, Condensate, Demineralized Water, Fuel Handling, and Hot Water Heating systems, copper alloy heat exchanger components exposed to treated water in the Feedwater system, and copper alloy heater coil exposed to treated water in the Hot Water Heating system. In addition galvanic corrosion is an additional aging mechanism that will be managed in the Demineriliz\u200ced Water and Fuel Handling systems See Subsection 3.4.2.2.7.1.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	Components in Chemical and Volume Control, Demineralized Water, Fuel Handling, Hot Water Heating, Mechanical Seal Supply, Radiation Monitoring, Reactor Coolant, ,Reactor Make-Up Water, Release Recovery, and Sample systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry Program, B.2.1.2 to manage loss of material due to pitting and crevice corrosion in stainless steel piping components exposed to treated water in the Auxiliary Steam, Auxiliary Steam Condensate, Chemical and Volume Control, Condensate, Demineralized Water, Feedwater, Fuel Handling, Hot Water Heating, Main Steam, Mechanical Seal Supply, Radiation Monitoring, Reactor Coolant, Reactor Make-Up Water, Release Recovery, Sample, and Steam Generator Blowdown systems, and stainless steel heat exchanger components exposed to treated water in the Condensate, Mechanical Seal Supply, Feedwater, Radiation Monitoring, Sample, and Steam Generator Blowdown systems. See Subsection 3.4.2.2.7.1.
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	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited. The Buried Piping and Tanks Inspection Program (with exceptions), B.2.1.22, will be used to manage loss of material due to pitting, crevice, and in addition, microbiologically-influenced corrosion in stainless steel piping components exposed to soil in the Condensate system. See Subsection 3.4.2.2.7.2.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Consistent with NUREG-1801 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to general, pitting, and crevice corrosion in copper alloy piping components and copper alloy heat exchanger components exposed to lubricating oil in the Feedwater system. See Subsection 3.4.2.2.7.3.
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 with exceptions. The One-Time Inspection Program, B.2.1.20, will be used to verify the effectiveness of the Lubricating Oil Analysis Program (with exceptions), B.2.1.26, to manage loss of material due to pitting, crevice, and microbiologically-influenced corrosion in stainless steel piping components exposed to lubricating oil in the Feedwater and Main Steam systems, and stainless steel heat exchanger components exposed to lubricating oil in the Feedwater system, and stainless steel tanks exposed to lubricating oil in the Main Steam system. See 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	Not Applicable. The Steam and Power Conversion Systems have no 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	Not Applicable. The Steam and Power Conversion Systems have no high-strength steel closure bolting exposed to air with steam or water leakage.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. The Bolting Integrity Program, B.2.1.9, will be used to manage loss of material due to general, pitting, and crevice corrosion, and loss of preload due to thermal effects, gasket creep, and self-loosening in steel bolting exposed to air-indoor uncontrolled in the Auxiliary Steam, Auxiliary Steam Condensate, Auxiliary Steam Heating, Condensate, Feedwater, Main Steam, and Steam Generator Blowdown systems.
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	Not Applicable. The Steam and Power Conversion Systems have no stainless steel piping components exposed to closed cycle cooling water >60°C (>140°F).
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	Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water Program (with exceptions), B.2.1.12, will be used to manage loss of material due to galvanic, general, pitting, and crevice corrosion in steel heat exchanger components in the Steam Generator Blowdown system.
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	Components in the Radiation Monitoring system have been aligned to this line item based material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water Program (with exceptions), B.2.1.12, will be used to manage loss of material due to pitting and crevice corrosion in the stainless steel heat exchanger components exposed to closed cycle cooling water in the Radiation Monitoring system. The Steam and Power Conversion Systems have no stainless steel piping components and heat exchanger components exposed to closed cycle cooling water.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Not Applicable. The Steam and Power Conversion Systems have no copper alloy piping components exposed to closed cycle cooling water.
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	Not Applicable. The Steam and Power Conversion Systems have no steel, stainless steel, and copper alloy heat exchanger tubes exposed to closed cycle cooling water.
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 with exceptions. The External Surfaces Monitoring Program (with exceptions), B.2.1.24, will be used to manage loss of material due to general corrosion on the steel external surfaces exposed to air-indoor uncontrolled (external) in the Auxiliary Steam, Auxiliary Steam Condensate, Auxiliary Steam Heating, Condensate, Feedwater, Main Steam, and Steam Generator Blowdown systems, and general, pitting, crevice, and galvanic corrosion of steel external surfaces in air-outdoor (external) in the Auxiliary Steam Condensate, and Main Steam systems, and general, pitting, and crevice corrosion of steel external surfaces in condensation (external) in the Circulating Water System.
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 Flow-Accelerated Corrosion Program, B.2.1.8, will be used to manage wall thinning due to flow accelerated corrosion in steel piping components exposed to steam or treated water in the Auxiliary Steam, Auxiliary Steam Condensate, Auxiliary Steam Heating, Feedwater, Main Steam, and Steam Generator Blowdown systems.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	Components in the Auxiliary Boiler, Control Building Air Handling, and Service Water systems have aligned with this line item based on material, environment, and aging effect. Consistent with NUREG-1801 with exceptions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to general, pitting, and crevice corrosion in steel piping components exposed to air outdoor (internal)in the Auxiliary Boiler, Control Building Air Handling, Main Steam, and Service Water systems, and steel fan housing exposed to air-outdoor (internal)in the Control Building Air Handling System, and steel piping components exposed to condensation (internal) in the Main Steam system.
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	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited. The raw water environment is potable water, which is domestic water from the town of Seabrook. Therefore, the Open-Cycle Cooling Water System Program is not applicable. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion in steel heat exchanger components exposed to raw water in the Auxiliary Steam Heating System. Galvanic is not an applicable aging mechanism since the heat exchanger components are not in contact with a more noble material. Additionally, macro fouling is not an applicable aging mechanism since the raw water environment is potable water, which is domestic water from the town of Seabrook.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited. The raw water environment is potable water in the Auxiliary Steam Condensate system and radioactive liquid waste drainage in the Auxiliary Steam system. Therefore, Open-Cycle Cooling Water System Program is not applicable. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to pitting, crevice, and microbiologically influenced corrosion in stainless steel piping components exposed to raw water in the Auxiliary Steam and Auxiliary Steam Condensate systems, and copper alloy piping components in the Auxiliary Steam system. Fouling is an additional aging effect in the stainless steel and copper alloy piping components in the Auxiliary Steam system.
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	Not Applicable. The Steam and Power Conversion Systems have no stainless steel heat exchanger components exposed to raw water.
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	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited. The raw water environment is potable water, which is domestic water from the town of Seabrook. Therefore, the Open-Cycle Cooling Water System Program is not applicable. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of heat transfer function in steel heat exchanger tubes exposed to raw water in the Auxiliary Steam Heating system.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 Selective Leaching of Materials Program (with exceptions), B.2.1.21, will be used to manage loss of material due to selective leaching in copper alloy >15% Zn piping components exposed to raw water in the Auxiliary Steam Condensate and Circulating Water systems, copper alloy >15% Zn piping components exposed to treated water in the Auxiliary Steam Condensate system, and copper alloy >15% Zn heat exchanger components exposed to treated water in the Feedwater system.
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-1801with exceptions. The Selective Leaching of Materials Program (with exceptions), B.2.1.21, will be used to manage loss of material due to selective leaching in gray cast iron piping components exposed to raw water in the Auxiliary Steam Condensate, Auxiliary Steam Heating and Circulating Water systems and gray cast iron piping components exposed to treated water in the Auxiliary Steam, Auxiliary Steam Condensate, and Feedwater systems.
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	Components in the Steam Generator and Fire Protection systems have been aligned to this line item due to material, environment, and aging effect. Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage loss of material due to pitting and crevice corrosion in stainless steel piping components exposed to steam in the Auxiliary Steam, Feedwater, , Main Steam, and Steam Generator systems. Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage loss of material due to pitting and crevice corrosion in stainless steel heat exchanger components exposed to steam in the Condensate and Fire Protection systems. Consistent with NUREG-1801. The Water Chemistry

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					Program, B.2.1.2, will be used to manage loss of material due to pitting and crevice corrosion in nickel alloy piping components exposed to steam in the Steam Generator. Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage loss of material due general (additional aging effect), pitting, and crevice corrosion in steel piping components exposed to steam in the Feed Water, Main Steam, and Steam Generator systems. Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage loss of material due general (additional aging effect), pitting, and crevice corrosion in steel tanks, and steel turbine casing exposed to steam in the Feedwater system. Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited The steam environment is potable water heated into steam. Therefore, the Water Chemistry Program is not applicable. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to pitting and crevice corrosion in stainless steel piping components & stainless steel heat exchanger components, and general (additional aging mechanism), pitting, and crevice corrosion in steel piping components & steel heat exchanger components exposed to steam environment in the Auxiliary Steam Heating system.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 Boric Acid Corrosion Program, B.2.1.4, will be used to manage loss of material due to boric acid corrosion on the steel bolting exposed to air with borated water leakage the Auxiliary Steam, Auxiliary Steam Condensate, Auxiliary Steam Heating, and Steam Generator Blowdown systems and steel external surfaces exposed to air with borated water leakage in the Auxiliary Steam, Auxiliary Steam Condensate, Auxiliary Steam Heating, Feedwater, Main Steam, and Steam Generator Blowdown systems.
3.4.1-39	Stainless steel piping, piping components, and piping elements exposed to steam	Cracking due to stress corrosion cracking	Water Chemistry	No	Components in the Fire Protection system have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking in stainless steel piping components exposed to steam in the Auxiliary Steam, Feedwater, and Main Steam systems, and stainless steel heat exchanger components exposed to steam in the Condensate and Fire Protection systems. Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited. The steam environment is potable water heated into steam. Therefore, the Water Chemistry Program is not applicable. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (with exceptions), B.2.1.25, will be used to manage loss of material due to cracking in stainless steel piping components & stainless steel heat exchanger components exposed to steam environment in the Auxiliary Steam Heating system.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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. Glass piping elements exposed to Air-Indoor Uncontrolled are contained in the Auxiliary Steam Condensate, Auxiliary Steam Heating, Condensate, Feedwater, and Main Steam systems. Glass piping components exposed to lubricating oil are contained in the Feedwater and Main Steam systems. Glass piping components exposed to raw water are contained in the Auxiliary Steam Condensate system. Glass piping components exposed to treated water are contained in the Auxiliary Steam Condensate, Auxiliary Steam Heating, and Condensate systems.
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. Copper alloy piping components exposed to Air-Indoor Uncontrolled (external) are contained in the Auxiliary Steam, Auxiliary Steam Condensate, Auxiliary Steam Heating, Condensate, and Feedwater systems. Stainless steel piping components exposed to Air-Indoor Uncontrolled (external) are contained in the Auxiliary Steam, Auxiliary Steam Condensate, Auxiliary Steam Heating, Condensate, Feedwater, Main Steam, and Steam Generator Blowdown systems. Stainless steel heat exchanger components exposed to Air-Indoor Uncontrolled (external) are contained in the Auxiliary Steam Heating, Feedwater, and Steam Generator Blowdown systems. Stainless steel tank exposed to Air-Indoor Uncontrolled (external) is contained in the Main Steam system. Copper alloy heat exchanger components exposed to Air-Indoor Uncontrolled (external) are contained in the Feedwater system.

Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-42	Steel piping, piping components, and piping elements exposed to air-indoor controlled (external)	None	None	NA - No AEM or AMP	Not Applicable. The Steam and Power Conversion systems have no steel piping components exposed to air-indoor controlled (external)
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. Stainless steel piping components in concrete are contained in the Condensate system.
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. Steel piping components exposed to gas are contained in the Main Steam system. Stainless steel piping components exposed to gas are contained in the Feedwater and Main Steam systems. Steel tanks exposed to gas are contained in the Feedwater and Main Steam systems.

Table 3.4.2-1

AUXILIARY STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VIII.H-4 (S-34)	3.4.1-22	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VIII.H-5 (S-33)	3.4.1-22	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-2 (S-40)	3.4.1-38	A
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	A A
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Steam (Internal)	Loss of Material	Selective Leaching of Materials Program	None	None	G
Filter Housing	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Filter Housing	Leakage Boundary (Spatial)	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	A A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

Table 3.4.2-1

AUXILIARY STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Steam (Internal)	Cracking	Water Chemistry Program	VIII.A-10 (SP-44)	3.4.1-39	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.A-12 (SP-43)	3.4.1-37	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Steam (Internal)	Wall Thinning	Flow-Accelerated Corrosion Program	VIII.C-5 (S-15)	3.4.1-29	A

Table 3.4.2-1

AUXILIARY STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-7 (S-10)	3.4.1-4	A A
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Wall Thinning	Flow-Accelerated Corrosion Program	VIII.F-26 (S-16)	3.4.1-29	A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.E-27 (SP-36)	3.4.1-32	E, 1
Thermowell	Pressure Boundary	Stainless Steel	Treated Borated Water (Internal)	Loss of Material	Water Chemistry Program	VII.E1-17 (AP-79)	3.3.1-91	A
Thermowell	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-1 (SP-16)	3.4.1-16	A A

Table 3.4.2-1

AUXILIARY STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Thermowell	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Thermowell	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-7 (S-10)	3.4.1-4	A A
Trap	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Trap	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-7 (S-10)	3.4.1-4	A A
Trap	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.A-8 (SP-27)	3.4.1-36	B
Trap	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Trap	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B

Table 3.4.2-1

AUXILIARY STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Trap	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-7 (S-10)	3.4.1-4	A A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	None	None	G
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Steam (Internal)	Loss of Material	Selective Leaching of Materials Program	None	None	G
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Steam (Internal)	Cracking	Water Chemistry Program	VIII.A-10 (SP-44)	3.4.1-39	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.A-12 (SP-43)	3.4.1-37	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A

Table 3.4.2-1

AUXILIARY STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-4 (S-06)	3.4.1-2	A A
Valve Body	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.C-7 (S-10)	3.4.1-4	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with radioactive liquid waste drainage. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VIII.H-4 (S-34)	3.4.1-22	A
Bolting	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VIII.H-5 (S-33)	3.4.1-22	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-2 (S-40)	3.4.1-38	A
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.E-23 (SP-27)	3.4.1-36	B

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.E-18 (SP-31)	3.4.1-32	E, 1
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.E-20 (SP-30)	3.4.1-35	B
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-15 (SP-61)	3.4.1-15	A A
Instrumentation Element	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.E-21 (SP-55)	3.4.1-35	B
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.E-30 (SP-17)	3.4.1-14	A A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
Piping and Fittings	Leakage Boundary (Spatial)	Copper Alloy	Air With Borated Water Leakage (External)	None	None	VII.J-5 (AP-11)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.E-18 (SP-31)	3.4.1-32	E, 1
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-15 (SP-61)	3.4.1-15	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.E-27 (SP-36)	3.4.1-32	E, 1

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.E-30 (SP-17)	3.4.1-14	A A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Piping and Fittings	Structural Integrity (Attached)	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8 (S-41)	3.4.1-28	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Piping and Fittings	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.G-36 (S-12)	3.4.1-8	E, 2
Piping and Fittings	Leakage Boundary (Spatial) Structural Integrity (Attached)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Structural Integrity (Attached)	Steel	Treated Water (Internal)	Wall Thinning	Flow-Accelerated Corrosion Program	VIII.E-35 (S-16)	3.4.1-29	A
Piping Element	Leakage Boundary (Spatial) Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A
Piping Element	Pressure Boundary	Glass	Raw Water (Internal)	None	None	VIII.I-7 (SP-34)	3.4.1-40	A
Piping Element	Leakage Boundary (Spatial)	Glass	Treated Water (Internal)	None	None	VIII.I-8 (SP-35)	3.4.1-40	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Pump Casing	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.G-36 (S-12)	3.4.1-8	E, 2

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.G-24 (SP-28)	3.4.1-36	B
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.E-23 (SP-27)	3.4.1-36	B
Tank	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Tank	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Tank	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.G-36 (S-12)	3.4.1-8	E, 2
Tank	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.E-30 (SP-17)	3.4.1-14	A A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Trap	Leakage Boundary (Spatial) Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Trap	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Trap	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.G-36 (S-12)	3.4.1-8	E, 2
Trap	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.G-24 (SP-28)	3.4.1-36	B
Trap	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Trap	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.E-23 (SP-27)	3.4.1-36	B
Trap	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Trap	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Trap	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VII.I-12 (AP-66)	3.3.1-88	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.E-18 (SP-31)	3.4.1-32	E, 1
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.E-20 (SP-30)	3.4.1-35	B

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-15 (SP-61)	3.4.1-15	A A
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.E-21 (SP-55)	3.4.1-35	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.E-27 (SP-36)	3.4.1-32	E, 1
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.E-30 (SP-17)	3.4.1-14	A A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A

Table 3.4.2-2

AUXILIARY STEAM CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Valve Body	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.G-36 (S-12)	3.4.1-8	E, 2
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with domestic water from the town of Seabrook. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

2	NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.4.2-3

AUXILIARY STEAM HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VIII.H-4 (S-34)	3.4.1-22	A
Bolting	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VIII.H-5 (S-33)	3.4.1-22	A
Bolting	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-2 (S-40)	3.4.1-38	A
Filter Element	Filter	Stainless Steel	Steam (Internal/External)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-2 (SP-44)	3.4.1-39	E, 1
Filter Element	Filter	Stainless Steel	Steam (Internal/External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-3 (SP-43)	3.4.1-37	E, 1
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A

Table 3.4.2-3

AUXILIARY STEAM HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-8 (S-07)	3.4.1-37	E, 1
Filter Housing	Leakage Boundary (Spatial)	Gray Cast Iron	Steam (Internal)	Loss of Material	Selective Leaching of Materials Program	None	None	G
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Filter Housing	Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-8 (S-07)	3.4.1-37	E, 1
Heat Exchanger Components (Unit Heater 1-ASH-UH-197 and 198 Heating Coil)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	C
Heat Exchanger Components (Unit Heater 1-ASH-UH-197 and 198 Heating Coil)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Heat Exchanger Components (Unit Heater 1-ASH-UH-197 and 198 Heating Coil)	Leakage Boundary (Spatial)	Stainless Steel	Steam (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-2 (SP-44)	3.4.1-39	E, 1

Table 3.4.2-3

AUXILIARY STEAM HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (Unit Heater 1-ASH-UH-197 and 198 Heating Coil)	Leakage Boundary (Spatial)	Stainless Steel	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-3 (SP-43)	3.4.1-37	E, 1
Heat Exchanger Components (Unit Heater 1-ASH-UH-73, 74, 75, 110 and 111 Heating Coil)	Heat Transfer Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	C
Heat Exchanger Components (Unit Heater 1-ASH-UH-73, 74, 75, 110 and 111 Heating Coil)	Heat Transfer Pressure Boundary	Stainless Steel	Steam (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-2 (SP-44)	3.4.1-39	E, 1
Heat Exchanger Components (Unit Heater 1-ASH-UH-73, 74, 75, 110 and 111 Heating Coil)	Heat Transfer Pressure Boundary	Stainless Steel	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-3 (SP-43)	3.4.1-37	E, 1
Heat Exchanger Components (Unit Heater 1-ASH-UH-73, 74, 75, 110 and 111 Heating Coil)	Heat Transfer Pressure Boundary	Stainless Steel	Steam (Internal)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Heat Exchanger Components (Unit Heater 1-ASH-UH-73, 74, 75, 110 and 111 Heating Coil Fins)	Heat Transfer	Aluminum	Air-Indoor Uncontrolled (External)	Reduction of Heat Transfer	External Surfaces Monitoring Program	None	None	F

Table 3.4.2-3

AUXILIARY STEAM HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-ASH-E-218 Shell)	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Heat Exchanger Components (1-ASH-E-218 Tubes)	Heat Transfer Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.G-7 (S-24)	3.4.1-31	E, 2
Heat Exchanger Components (1-ASH-E-218 Tubes)	Heat Transfer Pressure Boundary	Steel	Raw Water (Internal)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.G-16 (S-27)	3.4.1-34	E, 2
Heat Exchanger Components (1-ASH-E-218 Shell)	Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-8 (S-07)	3.4.1-37	E, 1
Heat Exchanger Components (1-ASH-E-218 Tubes)	Heat Transfer Pressure Boundary	Steel	Steam (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-8 (S-07)	3.4.1-37	E, 1
Heat Exchanger Components (1-ASH-E-218 Tubes)	Heat Transfer Pressure Boundary	Steel	Steam (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Instrumentation Element	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B

Table 3.4.2-3

AUXILIARY STEAM HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.G-36 (S-12)	3.4.1-8	E, 3
Instrumentation Element	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.A-7 (SP-28)	3.4.1-36	B
Piping and Fittings	Pressure Boundary	Copper Alloy	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
Piping and Fittings	Pressure Boundary	Copper Alloy	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-8 (S-07)	3.4.1-37	E, 1

Table 3.4.2-3

AUXILIARY STEAM HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Steam (Internal)	Wall Thinning	Flow-Accelerated Corrosion Program	VIII.B1-9 (S-15)	3.4.1-29	A
Piping Element	Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A
Piping Element	Pressure Boundary	Glass	Raw Water (Internal)	None	None	VIII.I-7 (SP-34)	3.4.1-40	A
Tank	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Tank	Pressure Boundary	Steel	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.G-36 (S-12)	3.4.1-8	E, 3
Thermowell	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Thermowell	Leakage Boundary (Spatial)	Steel	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-8 (S-07)	3.4.1-37	E, 1
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A

Table 3.4.2-3

AUXILIARY STEAM HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Steam (Internal)	Loss of Material	Selective Leaching of Materials Program	None	None	G
Valve Body	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Valve Body	Pressure Boundary	Gray Cast Iron	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-8 (S-07)	3.4.1-37	E, 1
Valve Body	Pressure Boundary	Gray Cast Iron	Steam (Internal)	Loss of Material	Selective Leaching of Materials Program	None	None	G
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Steam (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-2 (SP-44)	3.4.1-39	E, 1
Valve Body	Leakage Boundary (Spatial)	Stainless Steel	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-3 (SP-43)	3.4.1-37	E, 1

Table 3.4.2-3

AUXILIARY STEAM HEATING SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Valve Body	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-8 (S-07)	3.4.1-37	E, 1

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	NUREG-1801 specifies the Water Chemistry Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The Auxiliary Steam Heating system is not applicable to the Water Chemistry Program.

2 NUREG-1801 specifies the Open-Cycle Cooling Water System Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The raw water environment is associated with domestic water from the town of Seabrook. Therefore, the Open-Cycle Cooling Water System Program is not applicable to this environment.

3 NUREG-1801 specifies a plant-specific program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.4.2-4

CIRCULATING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	Bolting Integrity Program	VII.D-1 (A-103)	3.3.1-44	A
Bolting	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Expansion Joint	Leakage Boundary (Spatial)	Elastomer	Condensation (External)	Hardening and Loss of Strength	External Surfaces Monitoring Program	None	None	H
Expansion Joint	Leakage Boundary (Spatial)	Elastomer	Raw Water (Internal)	Hardening and Loss of Strength	Open-Cycle Cooling Water System Program	VII.C1-1 (AP-75)	3.3.1-75	B
Expansion Joint	Leakage Boundary (Spatial)	Elastomer	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-2 (AP-76)	3.3.1-75	B
Piping and Fittings	Leakage Boundary (Spatial)	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Piping and Fittings	Leakage Boundary (Spatial)	Nickel Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-13 (AP-53)	3.3.1-78	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-10 (S-42)	3.4.1-28	B
Piping and Fittings	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-19 (A-38)	3.3.1-76	B

Table 3.4.2-4

CIRCULATING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial)	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Thermowell	Leakage Boundary (Spatial)	Nickel Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-13 (AP-53)	3.3.1-78	B
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-9 (A-44)	3.3.1-81	B
Valve Body	Leakage Boundary (Spatial)	Copper Alloy >15% Zn	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.A-6 (SP-30)	3.4.1-35	B
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-10 (S-42)	3.4.1-28	B
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-19 (A-38)	3.3.1-76	B
Valve Body	Leakage Boundary (Spatial)	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.A-7 (SP-28)	3.4.1-36	B
Valve Body	Leakage Boundary (Spatial)	Nickel Alloy	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G

Table 3.4.2-4

CIRCULATING WATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial)	Nickel Alloy	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-13 (AP-53)	3.3.1-78	B
Valve Body	Leakage Boundary (Spatial)	Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-10 (S-42)	3.4.1-28	B
Valve Body	Leakage Boundary (Spatial)	Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System Program	VII.C1-19 (A-38)	3.3.1-76	B

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.4.2-5

CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VIII.H-4 (S-34)	3.4.1-22	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VIII.H-5 (S-33)	3.4.1-22	A
Heat Exchanger Components (1-CO-E-111 Tubes)	Pressure Boundary	Stainless Steel	Steam (External)	Cracking	Water Chemistry Program	VIII.B1-2 (SP-44)	3.4.1-39	C
Heat Exchanger Components (1-CO-E-111 Tubes)	Pressure Boundary	Stainless Steel	Steam (External)	Loss of Material	Water Chemistry Program	VIII.B1-3 (SP-43)	3.4.1-37	C
Heat Exchanger Components (1-CO-E-111 Tubes)	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-36 (S-22)	3.4.1-16	A A
Heat Exchanger Components (1-CO-E-111 Channel Head)	Pressure Boundary	Steel	Air Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	A
Heat Exchanger Components (1-CO-E-111 Channel Head)	Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-37 (S-19)	3.4.1-3	A A

Table 3.4.2-5

CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-CO-E-111-Tubesheet)	Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-37 (S-19)	3.4.1-3	A A
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Orifice	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Concrete (External)	None	None	VIII.I-11 (SP-13)	3.4.1-43	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Soil (External)	Loss of Material	Buried Piping and Tanks Inspection Program	VIII.E-28 (SP-37)	3.4.1-17	E, 1

Table 3.4.2-5

CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A
Piping and Fittings	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Piping and Fittings	Pressure Boundary	Steel	Soil (External)	Loss of Material	Buried Piping and Tank Inspection Program	VIII.E-1 (S-01)	3.4.1-11	B
Piping and Fittings	Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A
Piping Element	Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A
Piping Element	Pressure Boundary	Glass	Treated Water (Internal)	None	None	VIII.I-8 (SP-35)	3.4.1-40	A
Pump	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Pump	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Tank	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Tank	Pressure Boundary	Stainless Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	None	None	G

Table 3.4.2-5

CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Thermowell	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Thermowell	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Pressure Boundary	CASS	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Valve Body	Pressure Boundary	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Pressure Boundary	Copper alloy	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
Valve Body	Pressure Boundary	Copper alloy	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-15 (SP-61)	3.4.1-15	A A
Valve Body	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

Table 3.4.2-5

CONDENSATE SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-29 (SP-16)	3.4.1-16	A A
Valve Body	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Valve Body	Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-34 (S-10)	3.4.1-4	A A

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

F Material not in NUREG-1801 for this component.

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 specifies a plant-specific program for this line item. The Buried Piping and Tank Inspection Program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VIII.H-4 (S-34)	3.4.1-22	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VIII.H-5 (S-33)	3.4.1-22	A
Filter Housing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None -	None	VIII.I-10 (SP-12)	3.4.1-41	A
Filter Housing	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-3 (SP-38)	3.4.1-19	B A
Filter Housing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Filter Housing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A
Heat Exchanger Components (1-FW-E-96 Channel Head)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	C

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-FW-E-96 Channel Head)	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	C C
Heat Exchanger Components (1-FW-E-96 Shell)	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	C
Heat Exchanger Components (1-FW-E-96 Shell)	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.G-3 (S-20)	3.4.1-19	B A
Heat Exchanger Components (1-FW-E-96 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.G-3 (S-20)	3.4.1-19	B A
Heat Exchanger Components (1-FW-E-96 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.G-12 (SP-62)	3.4.1-10	B A
Heat Exchanger Components (1-FW-E-96 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	C C
Heat Exchanger Components (1-FW-E-96 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Water (Internal)	Reduction of Heat Transfer	Water Chemistry Program One-Time Inspection Program	VIII.E-13 (SP-40)	3.4.1-9	A A

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-FW-E-96 Tube Sheet)	Heat Transfer Pressure Boundary	Stainless Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.G-3 (S-20)	3.4.1-19	B A
Heat Exchanger Components (1-FW-E-96 Tube Sheet)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	C C
Heat Exchanger Components (1-FW-E-172 Channel Head)	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
Heat Exchanger Components (1-FW-E-172 Channel Head)	Pressure Boundary	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-15 (SP-61)	3.4.1-15	C C
Heat Exchanger Components (1-FW-E-172 Channel Head)	Pressure Boundary	Copper Alloy >15% Zn	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.G-23 (SP-55)	3.4.1-35	D
Heat Exchanger Components (1-FW-E-172 Shell)	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
Heat Exchanger Components (1-FW-E-172 Shell)	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-2 (SP-32)	3.4.1-18	D C

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-FW-E-172 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.G-3 (S-20)	3.4.1-19	B A
Heat Exchanger Components (1-FW-E-172 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.G-12 (SP-62)	3.4.1-10	B A
Heat Exchanger Components (1-FW-E-172 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	C C
Heat Exchanger Components (1-FW-E-172 Tubes)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Water (Internal)	Reduction of Heat Transfer	Water Chemistry Program One-Time Inspection Program	VIII.E-13 (SP-40)	3.4.1-9	A
Heat Exchanger Components (1-FW-E-172 Tube Sheet)	Heat Transfer Pressure Boundary	Stainless Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.G-3 (S-20)	3.4.1-19	B A
Heat Exchanger Components (1-FW-E-172 Tube Sheet)	Heat Transfer Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	C C
Instrumentation Element	Pressure Boundary	Aluminum	Air-Indoor Uncontrolled (External)	None -	None	V.F-2 (EP-3)	3.2.1-50	A

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Aluminum	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	None	None	G
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
Instrumentation Element	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-2 (SP-32)	3.4.1-18	B A
Instrumentation Element	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Instrumentation Element	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Instrumentation Element	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	A A
Instrumentation Element	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A
Orifice	Pressure Boundary Throttle	Cass	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Orifice	Pressure Boundary Throttle	Cass	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.D1-5 (SP-17)	3.4.1-14	A A
Orifice	Pressure Boundary Throttle	Cass	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	A A
Orifice	Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Orifice	Pressure Boundary Throttle	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	A A
Orifice	Pressure Boundary Throttle	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Orifice	Pressure Boundary Throttle	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-3 (SP-38)	3.4.1-19	B A
Piping and Fittings	Pressure Boundary	Stainless Steel	Steam (Internal)	Cracking	Water Chemistry Program	VIII.B1-2 (SP-44)	3.4.1-39	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-3 (SP-43)	3.4.1-37	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.D1-5 (SP-17)	3.4.1-14	A A

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Piping and Fittings	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Piping and Fittings	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A
Piping and Fittings	Pressure Boundary	Steel	Steam (Internal)	Cumulative Fatigue Damage	TLAA	VIII.D1-7 (S-11)	3.4.1-1	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-8 (S-10)	3.4.1-4	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Treated Water (Internal)	Wall Thinning	Flow-Accelerated Corrosion Program	VIII.D1-9 (S-16)	3.4.1-29	A

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping Element	Pressure Boundary	Glass	Air-Indoor Uncontrolled (External)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A
Piping Element	Pressure Boundary	Glass	Lubricating Oil (Internal)	None	None	VIII.I-6 (SP-10)	3.4.1-40	A
Pump Casing	Leakage Boundary (Spatial) Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Pump Casing	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-8 (S-10)	3.4.1-4	A A
Pump Casing	Leakage Boundary (Spatial)	Gray Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials Program	VIII.G-26 (SP-27)	3.4.1-36	B
Pump Casing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Pump Casing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-8 (S-10)	3.4.1-4	A A
Tank	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Tank	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Tank	Pressure Boundary	Steel	Gas (Internal)	None	None	VIII.I-15 (SP-4)	3.4.1-44	C
Tank	Leakage Boundary (Spatial) Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	D C
Tank	Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-8 (S-07)	3.4.1-37	C
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	A A

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Thermowell	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A
Thermowell	Leakage Boundary (Spatial) Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-8 (S-10)	3.4.1-4	A A
Turbine Casing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Turbine Casing	Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-8 (S-07)	3.4.1-37	C
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Air-Indoor Uncontrolled (External)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
Valve Body	Pressure Boundary	Copper Alloy >15% Zn	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-2 (SP-32)	3.4.1-18	B A

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Pressure Boundary	Gray Cast Iron	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Valve Body	Pressure Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Valve Body	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-3 (SP-38)	3.4.1-19	B A
Valve Body	Pressure Boundary	Stainless Steel	Steam (Internal)	Cracking	Water Chemistry Program	VIII.B1-2 (SP-44)	3.4.1-39	A
Valve Body	Pressure Boundary	Stainless Steel	Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-3 (SP-43)	3.4.1-37	A

Table 3.4.2-6

FEEDWATER SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.D1-5 (SP-17)	3.4.1-14	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-4 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Valve Body	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.D1-6 (SP-25)	3.4.1-7	B A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.D1-8 (S-10)	3.4.1-4	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

Table 3.4.2-7

MAIN STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VIII.H-4 (S-34)	3.4.1-22	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VIII.H-5 (S-33)	3.4.1-22	A
Filter Housing	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Filter Housing	Leakage Boundary (Spatial)	Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-6 (SP-59)	3.4.1-30	B
Filter Housing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.A-14 (SP-25)	3.4.1-7	B A
Instrumentation Element	Leakage Boundary (Spatial)	Aluminum	Air-Indoor Uncontrolled (External)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Instrumentation Element	Leakage Boundary (Spatial)	Aluminum	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program	None	None	G

Table 3.4.2-7

MAIN STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Leakage Boundary (Spatial)	Aluminum	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection Program	None	None	G
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Orifice	Leakage Boundary (Spatial) Pressure Boundary Throttle	Stainless Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G
Orifice	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.D-4 (AP-81)	3.3.1-54	E, 1
Piping and Fittings	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Piping and Fittings	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A

Table 3.4.2-7

MAIN STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.A-9 (SP-38)	3.4.1-19	B A
Piping and Fittings	Pressure Boundary	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.B1-5 (SP-17)	3.4.1-14	A A
Piping and Fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-4 (SP-16)	3.4.1-16	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Outdoor (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8 (S-41)	3.4.1-28	B
Piping and Fittings	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A

Table 3.4.2-7

MAIN STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-6 (SP-59)	3.4.1-30	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-7 (SP-60)	3.4.1-30	B
Piping and Fittings	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.A-14 (SP-25)	3.4.1-7	B A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-8 (S-07)	3.4.1-37	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Steam (Internal)	Wall Thinning	Flow-Accelerated Corrosion Program	VIII.B1-9 (S-15)	3.4.1-29	A
Piping and Fittings	Pressure Boundary	Steel	Steam (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B1-10 (S-08)	3.4.1-1	A

Table 3.4.2-7

MAIN STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping Element	Leakage Boundary (Spatial)	Glass	Air-Indoor Uncontrolled (External)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A
Piping Element	Leakage Boundary (Spatial)	Glass	Lubricating Oil (Internal)	None	None	VIII.I-6 (SP-10)	3.4.1-40	A
Pump Casing	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Pump Casing	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.A-14 (SP-25)	3.4.1-7	B A
Tank	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	C
Tank	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.A-9 (SP-38)	3.4.1-19	D C
Tank	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Tank	Pressure Boundary	Steel	Gas (Internal)	None	None	VIII.I-15 (SP-4)	3.4.1-44	A

Table 3.4.2-7

MAIN STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Tank	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.A-14 (SP-25)	3.4.1-7	D C
Trap	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Trap	Leakage Boundary (Spatial)	Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-6 (SP-59)	3.4.1-30	B
Trap	Leakage Boundary (Spatial)	Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-7 (SP-60)	3.4.1-30	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Valve Body	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Pressure Boundary	Stainless Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	None	None	G

Table 3.4.2-7

MAIN STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VII.D-4 (AP-81)	3.3.1-54	E,1
Valve Body	Pressure Boundary	Stainless Steel	Gas (Internal)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
Valve Body	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.A-9 (SP-38)	3.4.1-19	B A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Steam (Internal)	Cracking	Water Chemistry Program	VIII.B1-2 (SP-44)	3.4.1-39	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-3 (SP-43)	3.4.1-37	A
Valve Body	Pressure Boundary	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.B1-5 (SP-17)	3.4.1-14	A A
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.B1-4 (SP-16)	3.4.1-16	A A

Table 3.4.2-7

MAIN STEAM SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Outdoor (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-6 (SP-59)	3.4.1-30	B
Valve Body	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program	VIII.B1-7 (SP-60)	3.4.1-30	B
Valve Body	Pressure Boundary	Steel	Gas (Internal)	None	None	VIII.I-15 (SP-4)	3.4.1-44	A
Valve Body	Pressure Boundary	Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis Program One-Time Inspection Program	VIII.A-14 (SP-25)	3.4.1-7	B A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Steam (Internal)	Loss of Material	Water Chemistry Program	VIII.B1-8 (S-07)	3.4.1-37	A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	NUREG-1801 specifies the Compressed Air Monitoring Program for this line item. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The component that is aligned with this line item is associated with the Main Steam System and therefore, the Compressed Air Monitoring Program is not applicable.

Table 3.4.2-8

STEAM GENERATOR BLOWDOWN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Bolting	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	None	None	G
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity Program	VIII.H-4 (S-34)	3.4.1-22	A
Bolting	Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Preload	Bolting Integrity Program	VIII.H-5 (S-33)	3.4.1-22	A
Bolting	Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-2 (S-40)	3.4.1-38	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII-I-10 (SP-12)	3.4.1-41	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Filter Housing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Heat Exchanger Components (1-SB-E-88A and 88B Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	C

Table 3.4.2-8

STEAM GENERATOR BLOWDOWN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-SB-E-88A and 88B Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (1-SB-E-88A and 88B Channel Head)	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-27 (S-22)	3.4.1-16	A A
Heat Exchanger Components (1-SB-E-88A and 88B Channel Head Cover)	Leakage Boundary (Spatial)	Steel With Stainless Steel Cladding	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Heat Exchanger Components (1-SB-E-88A and 88B Channel Head Cover)	Leakage Boundary (Spatial)	Steel With Stainless Steel Cladding	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Heat Exchanger Components (1-SB-E-88A and 88B Channel Head Cover)	Leakage Boundary (Spatial)	Steel With Stainless Steel Cladding	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-27 (S-22)	3.4.1-16	A A
Heat Exchanger Components (1-SB-E-88A and 88B Shell)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Heat Exchanger Components (1-SB-E-88A and 88B Shell)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A

Table 3.4.2-8

STEAM GENERATOR BLOWDOWN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Heat Exchanger Components (1-SB-E-88A and 88B Shell)	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VIII.F-4 (S-23)	3.4.1-24	B
Heat Exchanger Components (1-SB-E-90 Channel Head)	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Heat Exchanger Components (1-SB-E-90 Channel Head)	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Heat Exchanger Components (1-SB-E-90 Channel Head)	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VIII.F-4 (S-23)	3.4.1-24	B
Heat Exchanger Components (1-SB-E-90 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	C
Heat Exchanger Components (1-SB-E-90 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	C
Heat Exchanger Components (1-SB-E-90 Shell)	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-27 (S-22)	3.4.1-16	A A
Instrumentation Element	Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Instrumentation Element	Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

Table 3.4.2-8

STEAM GENERATOR BLOWDOWN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Instrumentation Element	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Orifice	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Orifice	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Orifice	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Orifice	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.F-24 (SP-17)	3.4.1-14	A A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A

Table 3.4.2-8

STEAM GENERATOR BLOWDOWN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Piping and Fittings	Leakage Boundary (Spatial)	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.F-24 (SP-17)	3.4.1-14	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-25 (S-10)	3.4.1-4	A A
Piping and Fittings	Leakage Boundary (Spatial) Pressure Boundary	Steel	Treated Water (Internal)	Wall Thinning	Flow-Accelerated Corrosion Program	VIII.F-26 (S-16)	3.4.1-29	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIIi.I-10 (SP-12)	3.4.1-41	A

Table 3.4.2-8

STEAM GENERATOR BLOWDOWN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Pump Casing	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Tank	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Tank	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Tank	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.E-40 (S-13)	3.4.1-6	A A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Thermowell	Leakage Boundary (Spatial)	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Thermowell	Leakage Boundary (Spatial)	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A

Table 3.4.2-8

STEAM GENERATOR BLOWDOWN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermowell	Leakage Boundary (Spatial)	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Thermowell	Leakage Boundary (Spatial)	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-25 (S-10)	3.4.1-4	A A
Valve Body	Leakage Boundary (Spatial)	CASS	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Valve Body	Leakage Boundary (Spatial)	CASS	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial)	CASS	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial)	CASS	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.F-24 (SP-17)	3.4.1-14	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air-Indoor Uncontrolled (External)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

Table 3.4.2-8

STEAM GENERATOR BLOWDOWN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Air With Borated Water Leakage (External)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-23 (SP-16)	3.4.1-16	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Stainless Steel	Treated Water >140° F (Internal)	Cracking	Water Chemistry Program One-Time Inspection Program	VIII.F-24 (SP-17)	3.4.1-14	A A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air With Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	VIII.H-9 (S-30)	3.4.1-38	A
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Air-Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7 (S-29)	3.4.1-28	B
Valve Body	Leakage Boundary (Spatial)	Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System Program	VII.C2-14 (A-25)	3.3.1-47	B

Table 3.4.2-8

STEAM GENERATOR BLOWDOWN SYSTEM

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Valve Body	Leakage Boundary (Spatial) Pressure Boundary	Steel	Treated Water (Internal)	Loss of Material	Water Chemistry Program One-Time Inspection Program	VIII.F-25 (S-10)	3.4.1-4	A A

Standard Notes:

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program
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.

3.5 AGING MANAGEMENT OF SYSTEMS, STRUCTURES, AND COMPONENT SUPPORTS

3.5.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.4, Structures and Component Supports, as being subject to aging management review. The Structures and Component Supports or portions of Structures, Component Supports and commodities, which are addressed in this section, are described in the indicated sections.

- Buildings, Structures Within License Renewal (2.4.1)
- Containment Structures (2.4.2)
- Fuel Handling and Overhead Cranes (2.4.3)
- Miscellaneous Yard Structures (2.4.4)
- Primary Structures (2.4.5)
- Supports (2.4.6)
- Turbine Building (2.4.7)
- Water Control Structures (2.4.8)

Table 3.5.1, Summary of Aging Management Evaluations for Structures and Component Supports, provides a summary comparison of the Seabrook Station aging management activities with the aging management activities evaluated in NUREG-1801 for Structures and Component Supports. Text addressing summary items requiring further evaluation is provided in Section 3.5.2.2.

3.5.2 RESULTS

The following tables summarize the results of the aging management review for Structures and Component Supports:

Table 3.5.2-1	Summary of Aging Management Evaluation - Buildings, Structures Within License Renewal
Table 3.5.2-2	Summary of Aging Management Evaluation - Containment Structures
Table 3.5.2-3	Summary of Aging Management Evaluation - Fuel Handling and Overhead Cranes
Table 3.5.2-4	Summary of Aging Management Evaluation - Miscellaneous Yard Structures
Table 3.5.2-5	Summary of Aging Management Evaluation - Primary Structures
Table 3.5.2-6	Summary of Aging Management Evaluation - Supports

Table 3.5.2-7	Summary of Aging Management Evaluation - Turbine Building
Table 3.5.2-8	Summary of Aging Management Evaluation - Water Control Structures

The materials of construction, service environments, aging effects requiring management, and credited aging management programs are provided for each of the system, structures and component supports system in the following Sections:

- Buildings, Structures Within License Renewal (3.5.2.1.1)
- Containment Structures (3.5.2.1.2)
- Fuel Handling and Overhead Cranes (3.5.2.1.3)
- Miscellaneous Yard Structures (3.5.2.1.4)
- Primary Structures (3.5.2.1.5)
- Supports (3.5.2.1.6)
- Turbine Building (3.5.2.1.7)
- Water Control Structures (3.5.2.1.8)

3.5.2.1 Materials, Environments, Aging Effects Requiring Management and Aging Management Programs

3.5.2.1.1 Buildings, Structures Within License Renewal

Materials

The materials of construction for the Buildings, Structures Within License Renewal components are:

- Concrete
- Concrete Block
- Fluorogold
- Rock
- Roofing
- Stainless Steel
- Steel

Environments

The Buildings, Structures Within License Renewal components are exposed to the following environments:

- Air - Indoor Uncontrolled (External)

- Air - Outdoor (External)
- Ground Water / Soil (External)
- Raw Water (External)

Aging Effects Requiring Management

The following aging effects associated with the Buildings, Structures Within License Renewal components require management:

- Cracking
- Cracking, Loss of Bond, Loss of Material (spalling, scaling)
- Expansion and Cracking
- Fretting or Lockup
- Increase in Porosity and Permeability, Cracking, Loss of Material (spalling, scaling)
- Increase in Porosity and Permeability, Loss of Strength
- Loss of Material
- Loss of Material, Loss of Form
- Separation, Environmental Degradation, Water in Leakage

The following aging management programs manage the aging effects for the Buildings, Structures Within License Renewal components:

- Fire Protection Program (B.2.1.15)
- Structures Monitoring Program (B.2.1.31)

Table 3.5.2-1, Summary of Aging Management Evaluation - Buildings, Structures Within License Renewal, summarizes the results of the aging management review for the Buildings, Structures within License Renewal.

3.5.2.1.2 Containment Structures

Materials

The materials of construction for the Containment Structures components are:

- Aluminum
- Concrete
- Elastomer
- Glass
- Roofing
- Stainless Steel

- Steel

Environments

The Containment Structures components are exposed to the following environments:

- Air - Indoor Uncontrolled (External)
- Air - Outdoor (External)
- Air - With Borated Water Leakage (External)
- Groundwater/Soil (External)
- Raw Water (External)

Aging Effects Requiring Management

The following aging effects associated with the Containment Structures components require management:

- Cracking
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Expansion and Cracking
- Increase in Porosity and Permeability, Cracking, Loss of Material (spalling, scaling)
- Increase in Porosity and Permeability, Loss of Strength
- Increased Hardness, Shrinkage and Loss of Strength
- Loss of Material and Cracking
- Loss of material
- Loss of Sealing, Leakage Through Containment
- Separation, Environmental Degradation, Water in Leakage

Aging Management Programs

The following aging management programs manage the aging effects for the Containment Structures components:

- ASME Section XI, Subsection IWE Program (B.2.1.27)
- ASME Section XI, Subsection IWL Program (B.2.1.28)
- Boric Acid Corrosion Program (B.2.1.4)
- Fire Protection Program (B.2.1.15)
- Structures Monitoring Program (B.2.1.31)

Table 3.5.2-2, Summary of Aging Management Evaluation - Containment Structures, summarizes the results of the aging management review for the Containment Structures

3.5.2.1.3 Fuel Handling and Overhead Cranes

Materials

The materials of construction for the Fuel Handling and Overhead Cranes components are:

- Steel

Environments

The Fuel Handling and Overhead Cranes components are exposed to the following environments:

- Air - Indoor Uncontrolled (External)
- Air - With Borated Water Leakage (External)

Aging Effects Requiring Management

The following aging effects associated with the Fuel Handling and Overhead Cranes components require management:

- Loss of material

Aging Management Programs

The following aging management programs manage the aging effects for the Fuel Handling and Overhead Cranes components:

- Boric Acid Corrosion Program (B.2.1.4)
- Inspection of Heavy Load and Light Load (Related to Refueling) Handling Systems Program (B.2.1.13)
- Structures Monitoring Program (B.2.1.31)

Table 3.5.2-3, Summary of Aging Management Evaluation - Fuel Handling and Overhead Cranes, summarizes the results of the aging management review for the Fuel Handling and Overhead Cranes.

3.5.2.1.4 Miscellaneous Yard Structures

Materials

The materials of construction for the Miscellaneous Yard Structures components are:

- Aluminum
- Concrete
- Concrete Block

- Elastomer
- Roofing
- Stainless Steel
- Steel

Environments

The Miscellaneous Yard Structures components are exposed to the following environments:

- Air - Indoor Uncontrolled (External)
- Air - Outdoor (External)
- Ground Water / Soil (External)
- Raw Water (External)

Aging Effects Requiring Management

The following aging effects associated with the Miscellaneous Yard Structures components require management:

- Crack Initiation and Growth
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Cracking
- Expansion and Cracking
- Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)
- Increased hardness, shrinkage and loss of strength
- Loss of Material Cracking
- Loss of Material
- Separation, Environmental Degradation, Water In Leakage

Aging Management Programs

The following aging management programs manage the aging effects for the Miscellaneous Yard Structures components:

- Fire Protection Program (B.2.1.15)
- Structures Monitoring Program (B.2.1.31)

Table 3.5.2-4, Summary of Aging Management Evaluation - Miscellaneous Yard Structures, summarizes the results of the aging management review for the Miscellaneous Yard Structures.

3.5.2.1.5 Primary Structures

Materials

The materials of construction for the Primary Structures components are:

- Aluminum
- Concrete
- Elastomer
- Lubrite
- Non-Metallic Fire Proofing
- Roofing
- Stainless Steel
- Steel

Environments

The Primary Structures components are exposed to the following environments:

- Air - Indoor Uncontrolled (External)
- Air - Outdoor (External)
- Air - With Borated Water Leakage (External)
- Ground Water / Soil (External)
- Raw Water (External)
- Treated Borated Water (External)

Aging Effects Requiring Management

The following aging effects associated with the Primary Structures components require management:

- Cracking
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Expansion and Cracking
- Increase in Porosity and Permeability, Cracking, Loss of Material (spalling, scaling)
- Increase in Porosity and Permeability, Loss of Strength
- Increased Hardness, Shrinkage and Loss of Strength
- Loss of Material, Cracking
- Loss of material

- Loss of Mechanical Function
- Separation, Environmental Degradation, Water in Leakage

Aging Management Programs

The following aging management programs manage the aging effects for the Primary Structures components:

- Boric Acid Corrosion Program (B.2.1.4)
- Fire Protection Program (B.2.1.15)
- Structures Monitoring Program (B.2.1.31)
- Water Chemistry Program (B.2.1.2)

Table 3.5.2-5, Summary of Aging Management Evaluation - Primary Structures, summarizes the results of the aging management review for the Primary Structures.

3.5.2.1.6 Supports

Materials

The materials of construction for the Support components are:

- Aluminum
- Boral
- Concrete
- Elastomer
- Lubrite
- Stainless Steel
- Steel

Environments

The Support components are exposed to the following environments:

- Air - Indoor Uncontrolled (External)
- Air - Outdoor (External)
- Air - With Borated Water Leakage (External)
- Raw Water (External)
- Treated Borated Water (External)

Aging Effects Requiring Management

The following aging effects associated with the Support components require management:

- Cracking
- Loss of material
- Loss of Mechanical Function/ Corrosion, Distortion, Dirt, etc.
- Reduction in Concrete Anchor Capacity
- Reduction of Neutron Absorbing Capability and Loss of Material
- Reduction or Loss of Isolation Function

Aging Management Programs

The following aging management programs manage the aging effects for the Support components:

- ASME Section XI, Subsection IWF Program (B.2.1.29)
- Boral Monitoring Program (B.2.2.2)
- Boric Acid Corrosion Program (B.2.1.4)
- Structures Monitoring Program (B.2.1.31)
- Water Chemistry Program (B.2.1.2)

Table 3.5.2-6, Summary of Aging Management Evaluation - Supports, summarizes the results of the aging management review for the Supports.

3.5.2.1.7 Turbine Building

Materials

The materials of construction for the Turbine Building components are:

- Aluminum
- Concrete
- Concrete Block
- Elastomer
- Roofing
- Steel

Environments

The Turbine Building components are exposed to the following environments:

- Air - Indoor Uncontrolled (External)
- Air - Outdoor (External)
- Raw Water (External)

Aging Effects Requiring Management

The following aging effects associated with the Turbine Building components require management:

- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)/Corrosion of Embedded Steel
- Cracking
- Expansion and Cracking
- Increased hardness, shrinkage and loss of strength
- Increase in Porosity and Permeability, Cracking, Loss of Material (spalling, scaling)
- Loss of Material
- Loss of Material, Cracking
- Separation, Environmental Degradation, Water In leakage

Aging Management Programs

The following aging management programs manage the aging effects for the Turbine Building components:

- Fire Protection Program (B.2.1.15)
- Structures Monitoring Program (B.2.1.31)

Table 3.5.2-7, Summary of Aging Management Evaluation - Turbine Building, summarizes the results of the aging management review for the Turbine Building.

3.5.2.1.8 Water Control Structures

Materials

The materials of construction for the Water Control Structures components are:

- Concrete
- Elastomer
- Roofing
- Steel

Environments

The Water Control Structures components are exposed to the following environments:

- Air - Indoor Uncontrolled (External)

- Air - Outdoor (External)
- Ground Water / Soil (External)
- Raw Water (External)

Aging Effects Requiring Management

The following aging effects associated with the Water Control Structures components require management:

- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)/Corrosion of Embedded Steel
- Expansion and Cracking
- Increased hardness, shrinkage and loss of strength
- Increase in Porosity and Permeability, Cracking, Loss of Material (spalling, scaling)
- Concrete Cracking and Spalling
- Increase in Porosity and Permeability, Loss of Strength
- Loss of Material
- Loss of Material, Cracking
- Separation, Environmental Degradation, Water In leakage

Aging Management Programs

The following aging management programs manage the aging effects for the Water Control Structures components:

- Fire Protection Program (B.2.1.15)
- Structures Monitoring Program (B.2.1.31)

Table 3.5.2-8, Summary of Aging Management Evaluation - Water Control Structures, summarizes the results of the aging management review for the Water Control Structures.

3.5.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801 for Structures and Component Supports

NUREG-1801 indicates that further evaluation is necessary for certain aging effects and other issues. Section 3.5.2.2 of NUREG-1800 discusses these aging effects and other issues that require further evaluation. The following sections, numbered corresponding to the discussions in NUREG-1800, explain the Seabrook Station approach to these areas requiring further evaluation.

3.5.2.2.1 PWR and BWR Containments

3.5.2.2.1.1 Aging of Inaccessible Concrete Areas

NUREG-1800 item 3.5.2.2.1.1 relates to potential aging of inaccessible concrete areas in concrete and steel containments due to aggressive chemical attack and corrosion of embedded steel. NUREG-1801 indicates that further evaluation is necessary if the environment is aggressive.

The Seabrook Station containment inaccessible and accessible concrete areas are designed in accordance with American Concrete Institute (ACI) Specification 318-71. The resulting reinforced concrete is dense, with low permeability.

Degradation due to aggressive chemical attack is applicable to Seabrook Station. Aggressive chemical attack only becomes significant when environmental conditions exceed threshold values (Chlorides > 500 ppm, Sulfates >1500 ppm, or pH < 5.5). Seabrook Station is not located in areas exposed to sulfate attack, nor is it located near industrial plants whose emissions could alter environmental parameters, but is exposed to chloride attack. Groundwater analyses confirm that the Seabrook Station site groundwater is aggressive. Testing performed from November 2008 to September 2009 found pH values between 5.8 and 7.5, chloride values between 19 ppm and 3900 ppm, and sulfate values between 10 ppm and 100 ppm. Resistance to mild acid attack is enhanced through the use of dense concrete that has low permeability and a low water to cement ratio. Seabrook Station Structures Monitoring Program, B.2.1.31 will perform concrete testing and rebar inspection to determine the effects f the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Corrosion of embedded steel becomes significant if environmental conditions are found to be aggressive. As noted above, Seabrook Station groundwater analyses confirm that the Seabrook Station site groundwater is aggressive. Additionally, corrosion is not significant if the concrete has a low water to cement ratio, low permeability, and designed in accordance with ACI Standards (ACI 318 or ACI 349). The design and construction of the Seabrook Station concrete structures generally prevents corrosion of embedded steel from occurring. As a result, corrosion of embedded steel in the Seabrook Station containment building is managed by the Seabrook Station ASME Section XI, Subsection IWL Program, B.2.1.28.

Seabrook Station ASME Section XI, Subsection IWL Program, B.2.1.28 inspections are conducted per Seabrook Station procedures which provides instructions to perform visual examination of the concrete surfaces of the primary containment in accordance with requirements of IWL-2500. Examinations performed under visual examination (VT-3C) examine concrete surfaces for evidence of damage or degradation shown below:

- Chemical attack, abrasion or erosion sufficient to expose coarse aggregate.
- Water flowing from, or on, the surface of the concrete (except basement Annulus).
- Scaling and/or disintegration sufficient to expose coarse aggregate.
- Cracks, spalls, voids or popouts.
- Efflorescence, exudation and/or encrustation.
- Discoloration indicative of corrosion of embedded steel.
- Exposure of reinforcing steel.
- Cracking, blistering and/or peeling of coatings.

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 Structural Monitoring Program

NUREG-1800 item 3.5.2.2.1.2 indicates that cracks due to increased stress levels from settlement could occur in Pressurized Water Reactor (PWR) containments. Additionally, reduction of foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations could occur in PWR containments. For plants that rely on a dewatering system, NUREG-1801 recommends verification of the continued functionality of the dewatering system during the period of extended operation. For all plants, NUREG-1801 recommends no further evaluation if these issues are managed by the applicant's Structural Monitoring Program.

Seabrook Station does not rely on a dewatering system for control of settlement.

Seabrook Station structures are founded on sound bedrock, fill concrete, or consolidated backfill and do not have any potential areas of settlement or displacement. Similarly, gradation requirements, compaction criteria and compaction test for engineered fill ensure a foundation material that will support the design loads with negligible settlement. The concrete foundations at Seabrook Station are not constructed of porous concrete and are not subject to flowing water.

Therefore, both cracks and distortion due to increased stress levels from settlement, and reduction of foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations for the containment, are not aging effects requiring management for the period of extended operation.

3.5.2.2.1.3 Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

NUREG-1800 item 3.5.2.2.1.3 relates to reduction of strength and modulus of concrete due to elevated temperatures. NUREG-1801 recommends further evaluation of a plant-specific aging management program for any portion of the concrete containment components that exceed specified temperature limits, i.e., general area temperature greater than 150 °F and local area temperature greater than 200 °F.

Reduction of strength and modulus of concrete due to elevated temperatures is not applicable to Seabrook Station. Containment concrete degradation due to elevated temperatures is not applicable because no containment concrete structural components exceed the specified temperature limits. The containment structure cooling subsystem is designed to maintain the normal ambient air temperature in the containment structure at or below 120°F. The containment structure cooling subsystem also functions to prevent the concrete temperature in the area of the reactor supports from exceeding 150°F, and the neutron detector cavity from exceeding 135°F, during normal operation. If the pipe carries hot fluid, the space between the pipe and the sleeve is insulated to maintain the concrete temperature adjoining the embedded sleeve at or below 200° F during normal plant operation.

3.5.2.2.1.4 Loss of Material due to General, Pitting and Crevice Corrosion

NUREG-1800 item 3.5.2.2.1.4 relates to loss of material due to general, pitting and crevice corrosion for steel elements of accessible and inaccessible areas of containments. The American Society of Mechanical Engineers (ASME) Section XI, Subsection IWE and Title 10 Code of Federal Regulations (CFR) Part 50 Appendix J Programs are recommended to manage these aging effects. NUREG-1801 recommends further evaluation of plant-specific programs to manage these aging effects for inaccessible areas if corrosion is significant.

Corrosion for inaccessible areas (e.g., embedded containment liner) is not expected for Seabrook Station because containment concrete in contact with the embedded containment liner at Seabrook Station was designed, constructed, and inspected in accordance with applicable ACI and American Society for Testing and Materials (ASTM) standards, which provide for a good quality, dense, well cured, and low permeability concrete. Design practices and procedural controls ensured that the concrete was consistent with the recommendations and guidance provided by ACI 201.2R.

The seismic isolation material between the fill mat and the containment liner is sealed at the mat surface level with caulk. This caulked joint is examined for signs of degradation during Seabrook Station ASME Section XI, Subsection IWL Program, B.2.1.28 inspections.

Nonetheless, the absence of concrete aging effects is confirmed by inspections performed per the Seabrook Station ASME Section XI, Subsection IWL Program, B.2.1.28.

3.5.2.2.1.5 Loss of Pre-stress due to Relaxation, Shrinkage, Creep, and Elevated Temperature

NUREG-1800 item 3.5.2.2.1.5 relates to loss of pre-stress forces due to relaxation, shrinkage, creep, and elevated temperature for pre-stressed concrete containments. If loss of pre-stress is identified to be a Time-Limited Aging Analysis (TLAA), then it is required to be evaluated consistent with the 10 CFR 54.21(c).

The Seabrook Station Containment Building is not a pre-stressed concrete containment. Loss of pre-stress forces due to relaxation, shrinkage, creep, and elevated temperature for the containment is not applicable at Seabrook Station.

3.5.2.2.1.6 Cumulative Fatigue Damage

NUREG-1800 item 3.5.2.2.1.6 relates to fatigue analyses of containment components including suppression pool steel shells (including welded joints) and penetrations (including penetration sleeves, dissimilar metal welds, and penetration bellows. If such fatigue analyses are determined to be Time-Limited Aging Analyses (TLAAs), then they are required to be evaluated consistent with the 10 CFR 54.21(c).

The evaluation of Seabrook Station containment penetrations that experience significant cyclic loading is addressed separately in Section 4.7, "*Penetration Load Cycles*".

Fatigue analyses for the Seabrook Station containment liner plates are not part of the current licensing basis and therefore do not meet the definition of a TLAA as based on 10 CFR 54.3.

3.5.2.2.1.7 Cracking due to Stress Corrosion Cracking (SCC)

NUREG-1800 item 3.5.2.2.1.7 relates to cracking due to stress corrosion cracking of stainless steel penetration sleeves, penetration bellows, and dissimilar metal welds. Further evaluation is recommended to ensure that this aging effect is adequately managed.

The Seabrook Station Aging Management Review (AMR) results conclude that cracking due to Stress Corrosion Cracking (SCC) is not an aging effect requiring management for Seabrook Station stainless steel containment penetration sleeves, bellows, and dissimilar metal welds. Both high temperature (> 140 °F) and exposure to an aggressive environment are required for SCC to be applicable. At Seabrook Station, these two conditions are not simultaneously present for any stainless steel penetration sleeves, bellows, or dissimilar metal welds. Further, reviews of Seabrook Station plant-specific operating experience did not identify any Stress Corrosion Cracking (SCC) of these components.

3.5.2.2.1.8 Cracking due to Cyclic Loading

NUREG-1800 item 3.5.2.2.1.8 relates to cracking due to cyclic loading in shells and penetrations. Existing programs include the ASME Section XI, Subsection IWE and 10 CFR 50 Appendix J. However, NUREG-1801 recommends further evaluation, noting that visual examinations implemented by these programs may not have the ability to detect fine cracks that may result from cracking due to cyclic loading.

The Seabrook Station Aging Management Review (AMR) results conclude that cracking due to cyclic loading for containment components without Current Licensing Basis (CLB) fatigue analyses is not an aging effect requiring management. These components are designed to withstand operating stress levels and as such, cracking due to cyclic loading is unlikely to occur. Further, reviews of Seabrook Station operating experience did not identify any events related to cyclic loading induced cracking of containment components.

This subsection also lists components associated with Boiling Water Reactor (BWR) primary containment that require aging management for crack initiation and growth due to Stress Corrosion Cracking (SCC). These components are not applicable to Seabrook Station, a Pressurized Water Reactor (PWR).

3.5.2.2.1.9 Loss of Material (Scaling, Cracking and Spalling) due to Freeze-Thaw

NUREG-1800 item 3.5.2.2.1.9 relates to loss of material (scaling, cracking, and spalling) due to freeze-thaw in concrete containments. ASME Section XI, Subsection IWL program is recommended to manage this aging effect. However, NUREG-1801 recommends further evaluation of this aging effect for plants located in moderate to severe weathering conditions.

Loss of material due to freeze-thaw effects is not an aging effect requiring management for the Seabrook Station concrete containment. The Seabrook Station concrete containment is enclosed by a containment enclosure building and therefore is not exposed to severe weathering conditions. Loss of material (scaling, cracking, and spalling) due to freeze-thaw is only applicable to concrete containments exposed to severe weathering conditions.

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

NUREG-1800 item 3.5.2.2.1.10 relates to cracking due to expansion and reaction with aggregate, and to increase in porosity and permeability due to leaching of calcium hydroxide in concrete elements of containments. ASME Section XI, Subsection IWL is recommended to manage this aging effect. NUREG-1801 recommends further evaluation if the concrete was not constructed in accordance with the recommendations in ACI 201.2R.

At Seabrook Station, concrete was constructed equivalent to recommendations in ACI 201.2R.

Concrete aggregates used in Seabrook Station concrete structures were selected per ASTM C33, which uses ASTM C295 "*Petrographic Examination of Aggregates for Concrete*". Aggregates identified as potentially reactive were not used at Seabrook Station.

However, Seabrook Station conservatively manages cracking due to expansion and reaction with aggregates through the Seabrook Station ASME Section XI, Subsection IWL Program, B.2.1.28 and the Seabrook Station Structures Monitoring Program, B.2.1.31.

Loss of material due to leaching of calcium hydroxide is conservatively considered to be an aging effect requiring management for Seabrook Station. There have been indications of leaching in below grade concrete in Seabrook Station structures other than the Containment Building. Leaching of calcium hydroxide from reinforced concrete becomes significant only if the concrete is exposed to flowing water. Resistance to leaching is enhanced by using a dense, well-cured concrete with low permeability. These structures are designed in accordance with ACI 318 and constructed in accordance with ACI 301 and ASTM standards. However, due to the observed indications of leaching, Seabrook Station manages loss of material due to leaching of calcium hydroxide with the Seabrook Station ASME Section XI, Subsection IWL Program, B.2.1.28.

3.5.2.2.2 Safety-Related and Other Structures and Component Supports

3.5.2.2.2.1 Aging of Structures Not Covered by Structures Monitoring Program

1. Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling) Due to Corrosion of Embedded Steel for Groups 1-5, 7, 9 Structures.

   Concrete in inaccessible areas is evaluated for cracking, loss of bond, and loss of material due to corrosion of embedded steel. The NUREG-1801 description of an aggressive environment is pH < 5.5, chlorides > 500 ppm, or sulfates > 1500 ppm. Recent analysis of groundwater samples has shown an increase in chloride levels to above the threshold. Seabrook Station groundwater is currently classified as aggressive.

Therefore, cracking, loss of bond, and loss of material due to corrosion of embedded steel are aging effects requiring aging management for the period of extended operation.

When applicable, the condition of accessible areas may be used to evaluate the condition of inaccessible areas. Additionally, the Seabrook Station Structures Monitoring Program, B.2.1.31 will include examinations of concrete in soil below grade every 5 years or when excavated for any reason. To monitor the below grade environment, ground water chemistry will be sampled every 5 years for the above parameters as part of the Seabrook Station Structures Monitoring Program, B.2.1.31.

2. Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling) Due to Aggressive Chemical Attack for Groups 1-5, 7, 9 Structures.

   Concrete in inaccessible areas is evaluated for increase in porosity and permeability, cracking, and loss of material due to aggressive chemical attack. The NUREG-1801 description of an aggressive environment is pH < 5.5, chlorides > 500 ppm, or sulfates > 1500 ppm. Recent analysis of groundwater samples has shown an increase in chloride levels to above the threshold. Seabrook Station groundwater is currently classified as aggressive.

   Therefore, increase in porosity and permeability, cracking, and loss of material due to aggressive chemical attack are aging effects requiring aging management for the period of extended operation.

   When applicable, the condition of accessible areas may be used to evaluate the condition of inaccessible areas. Additionally, the Seabrook Station Structures Monitoring Program, B.2.1.31 will include examinations of concrete in below grade soil every 5 years or when excavated for any reason. To monitor the below grade environment, ground water chemistry will be sampled every 5 years for the above parameters as part of the Seabrook Station Structures Monitoring Program, B.2.1.31.

3. Loss of Material Due to Corrosion for Groups 1-5, 7, 8 Structures

   Loss of material due to corrosion is an aging effect requiring management for the period of extended operation. The Seabrook Station Structures Monitoring Program, B.2.1.31 will be used to manage this aging effect for Groups 1-5, 7, 8 Structures.

4. Loss of Material (Spalling, Scaling) and Cracking Due to Freeze-Thaw for Groups1-3, 5, 7-9 Structures

Concrete in inaccessible areas is evaluated for loss of material and cracking due to freeze-thaw. Seabrook Station is located in a severe weathering region according to Figure 1 of ASTM C33-07.

Due to the aggregate size used in Seabrook Station, the air content of the concrete is higher then 6% recommended by NUREG-1801 for freeze thaw resistance, but within the acceptable guidelines of ACI 201 and 318. The concrete is a dense, durable mixture of sound, coarse aggregate, cement and water. Because of the slight variation in the concrete, Seabrook Station will manage the aging effect of loss of material and cracking of concrete due to freeze-thaw for the period of extended operation.

5. Cracking Due to Expansion and Reaction With Aggregates for Group 1-5, 7-9 Structures.

   Concrete in inaccessible areas is evaluated for expansion and cracking due to reaction with aggregate. Tests and petrographic examinations performed according to ASTM C227-50 or ASTM C295-54 verified that aggregates used are not reactive. However, Seabrook Station conservatively manages cracking due to expansion and reaction with aggregates through the Seabrook Station Structures Monitoring Program, B.2.1.31.

6. Cracks and Distortion Due to Increased Stress Levels from Settlement for Groups 1-3, 5-9 Structures.

   Seabrook Station structures are founded on sound bedrock, fill concrete, or engineered backfill and do not have any potential areas of settlement or displacement which need be monitored. Similarly, gradation requirements, compaction criteria and compaction test for engineered fill ensure a foundation material which will support the design loads with negligible settlement. A dewatering system is not used at Seabrook Station. Therefore, cracks and distortion of concrete due to increased stress levels from settlement, are not aging effects requiring management for the period of extended operation.

7. Reduction in Foundation Strength, Cracking, Differential Settlement Due to Erosion of Porous Concrete Subfoundation for Groups 1-3, 5-9 Structures.

   Differential settlement and erosion of porous concrete sub-foundations is not applicable to Seabrook Station. The concrete foundations at Seabrook Station are not constructed of porous concrete.

   Therefore, reduction of foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations, are not aging effects requiring management for the period of extended operation.

8. Lock Up Due to Wear for Lubrite Radial Beam Seats in Drywell and Other Sliding Support Bearings and Sliding Support Surfaces.

   NUREG-1801 requires aging management for fretting or lockup due to mechanical wear of Lubrite® or similar material. However, Electric Power Research Institute (EPRI) Aging Effects for Structures and Structural Components (Structural Tools), evaluates the aging effect (loss of material) and says that wear is not significant since there is insufficient relative motion and frequency due to thermal cycling during plant heat-up, cool-down, and normal operation.

   Lubrite® materials for nuclear applications are designed to resist deformation, have a low coefficient of friction, resist softening at elevated temperatures, resist corrosion, withstand high intensities of radiation, and will not score or mar. Therefore, lock-up due to wear for Lubrite® plates is not an aging effect requiring management at Seabrook Station. Nonetheless, Lubrite® plate inspections are performed in accordance with the Seabrook Station Structures Monitoring Program, B.2.1.31 and Seabrook Station ASME Section XI, Subsection IWF Program, B.2.1.29 to confirm the absence of wear.

3.5.2.2.2.2 Aging Management of Inaccessible Areas

1. Loss of material due to freeze-thaw

   NUREG-1800 item 3.5.2.2.2.2 (1) relates to loss of material and cracking due to freeze-thaw in below-grade inaccessible concrete areas of Groups 1-3, 5, and 7-9 structures. Further evaluation of this aging effect is recommended for inaccessible areas of these Groups of structures for plants located in moderate to severe weathering conditions.

   Concrete in inaccessible areas is evaluated for loss of material and cracking due to freeze-thaw. Seabrook Station is located in a severe weathering region according to Figure 1 of ASTM C33-07.

   Due to the aggregate size used in Seabrook Station concrete, the air content of the concrete is higher then 6% as recommended by NUREG-1801 for freeze thaw resistance, but within the acceptable guidelines of ACI 201 and 318. The concrete is a dense, durable mixture of sound, coarse aggregate, cement and water. Because of the slight variation in the concrete, Seabrook Station will manage the aging effect of loss of material and cracking of concrete due to freeze-thaw for the period of extended operation.

   When applicable, the condition of accessible areas may be used to evaluate the condition of inaccessible areas. Additionally, the Seabrook Station Structures Monitoring Program, B.2.1.31 will include examinations of concrete below grade in soil every 5 years or when excavated for any reason. To monitor the below grade environment, ground water chemistry will be sampled every 5 years for the above parameters as part of the Seabrook Station Structures Monitoring Program, B.2.1.31.

2. Cracking due to expansion and reaction with aggregates

NUREG-1800 item 3.5.2.2.2.2 (2) relates to cracking due to expansion and reaction with aggregates in below-grade inaccessible concrete areas of Groups 1-5, and 7-9 structures. Further evaluation is recommended if the concrete was not constructed in accordance with the recommendations in ACI 201.2R.

Concrete was constructed equivalent to recommendations in ACI 201.2R.

Concrete aggregates used in Seabrook Station concrete structures were selected per ASTM C33, which uses ASTM C295 “Petrographic Examination of Aggregates for Concrete”. Aggregates identified as potentially reactive were not used at Seabrook Station. Nevertheless, Seabrook Station uses the Seabrook Station Structures Monitoring Program, B.2.1.31 to conservatively manage the aging effect of cracking of concrete due to expansion and reaction with aggregate.

3. Cracks and distortion due to increased stress levels from settlement and reduction of foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations.

NUREG-1800 item 3.5.2.2.2.2 (3) relates to cracks and distortion due to increased stress levels from settlement and reduction of foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations in below-grade inaccessible concrete areas of Groups 1-3, 5 and 7-9 structures. If the plant’s CLB credits a de-watering system, NUREG-1801 recommends verification of the continued functionality of the de-watering system during the period of extended operation. Otherwise, no further evaluation is required if this activity is included in the scope of the Structures Monitoring Program.

Seabrook Station does not rely on a dewatering system for control of settlement.

Differential settlement and erosion of porous concrete sub-foundations is not applicable to Seabrook Station. Seabrook Station structures are founded on sound bedrock, fill concrete, or engineered backfill that is not subject to significant settlement. The concrete foundations at Seabrook Station are not constructed of porous concrete and are not subject to flowing water.

Therefore, cracks and distortion due to increased stress levels from settlement, and reduction of foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations, are not aging effects requiring management for the period of extended operation.

4. Aggressive chemical attack and corrosion of embedded steel

Further evaluation is recommended by NUREG-1801 for aging management of inaccessible concrete areas exposed to an aggressive environment. Possible aging effects are increases in porosity and permeability, cracking, and loss of material (spalling, scaling) due to aggressive chemical attack and cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel. Periodic monitoring of below-grade water chemistry is recommended as an acceptable approach to demonstrate that the below-grade environment is not aggressive.

Degradation due to aggressive chemical attack is applicable to Seabrook Station. Aggressive chemical attack only becomes significant when environmental conditions exceed threshold values (Chlorides > 500 ppm, Sulfates >1500 ppm, or pH < 5.5). Seabrook Station is not located in areas exposed to sulfate attack, nor is it located near industrial plants whose emissions could alter environmental parameters, but is exposed to chloride attack. Groundwater analyses confirm that the Seabrook Station site groundwater is aggressive. Testing performed from November 2008 to September 2009 found pH values between 5.8 and 7.5, chloride values between 19 ppm and 3900 ppm, and sulfate values between 10 ppm and 100 ppm. Resistance to mild acid attack is enhanced through the use of dense concrete that has low permeability and a low water to cement ratio.

Corrosion of embedded steel becomes significant if environmental conditions are found to be aggressive. As noted above, Seabrook Station groundwater analyses confirm that the Seabrook Station site groundwater is aggressive. Seabrook Station concrete is designed with low water to cement ratio, low permeability, and designed in accordance with ACI Standards (ACI 318 or ACI 349). Seabrook Station Structures Monitoring Program, B.2.1.31 will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Conservatively, cracking, loss of bond, and loss of material due to corrosion of embedded steel are aging effects requiring aging management for the period of extended operation. Seabrook Station will use inspections conducted in accordance with the Seabrook Station Structures Monitoring Program, B.2.1.31 to meet this requirement.

5. Leaching of Calcium Hydroxide

NUREG-1800 indicates that further evaluation is recommended to address increases in porosity and permeability due to leaching of calcium hydroxide in below-grade inaccessible concrete areas in Groups 1-3, 5, and 7-9 structures. An aging management program is recommended only if the concrete was not constructed in accordance with the recommendations in ACI 201.2R. Otherwise, an aging management program is recommended.

Although concrete was constructed equivalent to recommendations in ACI 201.2R, loss of material due to leaching of calcium hydroxide is considered to be an aging effect requiring management for Seabrook Station. There have been indications of leaching in below grade concrete in Seabrook Station structures. Leaching of calcium hydroxide from reinforced concrete becomes significant only if the concrete is exposed to flowing water. Resistance to leaching is enhanced by using a dense, well-cured concrete with low permeability. These structures are designed in accordance with ACI 318 and constructed in accordance with ACI 301 and ASTM standards. Nevertheless, Seabrook Station manages loss of material due to leaching of calcium hydroxide with the Seabrook Station Structures Monitoring Program, B.2.1.31.

3.5.2.2.2.3 Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

NUREG-1800 item 3.5.2.2.2.3 relates to reduction of strength and modulus of concrete due to elevated temperatures in Group 1-5 concrete structures. For any concrete elements that exceed 150 °F for general areas and 200°F for local areas, further evaluation and implementation of a plant-specific program is recommended.

No in-scope Group 1-5 concrete structures at Seabrook Station exceed, or have areas that exceed, these thresholds.

3.5.2.2.2.4 Aging Management of Inaccessible Areas for Group 6 Structures

1. Increase in Porosity and Permeability, and Loss of Material (Spalling, Scaling), Chemical Attack; Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling), Corrosion of Embedded Steel.

   Evaluation of concrete in inaccessible areas for Increase in Porosity and Permeability, and Loss of Material (Spalling, Scaling), Chemical Attack; Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling), Corrosion of Embedded Steel is applicable to Seabrook Station. Aggressive chemical attack only becomes significant when environmental conditions exceed threshold values (Chlorides > 500 ppm, Sulfates >1500 ppm, or pH < 5.5). Seabrook Station is not located in areas exposed to sulfate attack, nor is it located near industrial plants whose emissions could alter environmental parameters, but is exposed to chloride attack. Groundwater analyses confirm that the Seabrook Station site groundwater is aggressive. Testing performed from November 2008 to September 2009 found pH values between 5.8 and 7.5, chloride values between 19 ppm and 3900 ppm, and sulfate values between 10 ppm and 100 ppm. Seabrook Station Structures Monitoring Program, B.2.1.31 will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Therefore Increase in Porosity and Permeability, and Loss of Material (Spalling, Scaling), Chemical Attack; Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling), Corrosion of Embedded Steel are aging effects requiring aging management for the period of extended operation.

When applicable, the condition of accessible areas may be used to evaluate the condition of inaccessible areas. Additionally, the Seabrook Station Structures Monitoring Program, B.2.1.31 will include examinations of below grade in soil concrete every 5 years or when excavated for any reason. To monitor the below grade environment, ground water chemistry will be sampled every 5 years for the above parameters as part of the Seabrook Station Structures Monitoring Program, B.2.1.31.

2. Loss of Material (Spalling, Scaling) and Cracking Due to Freeze-Thaw.

   Concrete in inaccessible areas is evaluated for loss of material and cracking due to freeze-thaw. Seabrook Station is located in a severe weathering region according to Figure 1 of ASTM C33-07 and due to the aggregate size the air content is higher then 6%, as recommended by the Generic Aging Lessons Learned (GALL) but, within the acceptable guidelines of ACI 201 and 318. The concrete is a dense, durable mixture of sound, coarse aggregate, cement and water. Therefore loss of material and cracking of concrete due to freeze-thaw is an aging effect requiring aging management for the period of extended operation.

3. Cracking Due to Expansion and Reaction With Aggregates and Increase in

   Porosity and Permeability, and Loss of Strength Due to Leaching of Calcium Hydroxide

   Concrete in inaccessible areas is evaluated for expansion and cracking due to reaction with aggregate. Tests and petrographic examinations performed according to ASTM C227-50 or ASTM C295-54 verified that aggregates used are not reactive. Nevertheless, Seabrook Station manages both cracking due to expansion and reaction with aggregates and Increase in porosity and permeability, and loss of material due to leaching of calcium hydroxide with the Seabrook Station Structures Monitoring Program, B.2.1.31.

3.5.2.2.2.5 Cracking due to Stress Corrosion Cracking and Loss of Material due to Pitting and Crevice Corrosion

Based on the EPRI Aging Effects for Structures and Structural Components (Structural Tools), aging management is not required for crack initiation and growth (cracking) due to stress corrosion cracking of stainless steel in the air/gas environment. The Seabrook Station environment does not contain aggressive contaminates, and the material temperature is less than 140°F. Both temperature and aggressive contaminate levels must breach industry limits for stress corrosion cracking to occur. Therefore, cracking of stainless steel due to stress corrosion cracking is not an aging effect requiring management at Seabrook Station. Loss of material due to pitting and crevice corrosion, however, is an aging effect that is managed at Seabrook Station.

3.5.2.2.2.6 Aging of Supports Not Covered by Structures Monitoring Program

NUREG-1800 item 3.5.2.2.2.6 relates to further evaluation of certain component support/aging effect combinations if they are not covered by the Structures Monitoring Program. This includes (1) loss of material due to general and pitting corrosion associated with Groups B2-B5 supports; (2) reduction in concrete anchor capacity due to degradation of the surrounding concrete associated with Groups B1-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements associated with Group B4 supports.

For items (1) through (3), the Seabrook Station responses are shown below:

(1) Loss of material due to general and pitting corrosion associated with Groups B2-B5 supports.

Consistent with NUREG-1800, Seabrook Station manages loss of material due to corrosion in Groups B2-B5 supports with the Seabrook Station Structures Monitoring Program, B.2.1.31.

(2) Reduction in concrete anchor capacity due to degradation of the surrounding concrete associated with Groups B1-B5 supports.

Consistent with NUREG-1800, Seabrook Station manages reduction in concrete anchor capacity due to degradation of the surrounding concrete with the Seabrook Station Structures Monitoring Program, B.2.1.31.

(3) Reduction/loss of isolation function due to degradation of vibration isolation elements associated with Group B4 supports

This item is not applicable to Seabrook Station. Seabrook Station does not have any supports with vibration isolation elements which require AMR. The vibration isolation elements identified by the Seabrook Station integrated plant assessment were determined to be integral parts of active equipment.

3.5.2.2.2.7 Cumulative Fatigue Damage due to Cyclic Loading

Due to cyclic loading, cumulative fatigue damage is possible for Groups B1.1, B1.2, and B1.3 component supports. If a TLAA, as defined in 10 CFR 54.3, exists, then the TLAA must be evaluated in accordance with 10 CFR 54.21(c).

The results of Seabrook Station reviews conducted to identify TLAAs in the current licensing basis did not identify any fatigue analyses for component support members, including anchor bolts or welds. Therefore, no evaluation in accordance with 10 CFR 54.21(c) is required.

3.5.2.2.3 Quality Assurance for Aging Management of Nonsafety-Related Components

Quality Assurance Program and Administrative Controls are discussed in Section B.1.3.

3.5.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAAs identified below are associated with the Containment systems components and referenced in LRA Section 4.7.

- Crane

3.5.3 CONCLUSION

The Structures and Component Supports subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B. These activities demonstrate that the aging effects associated with the Structures and Component Supports will be adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
PWR Concrete (Reinforced and Prestressed) and Steel Containments					
3.5.1-1	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 environment is aggressive	Seabrook manages accessible and inaccessible concrete components due to corrosion of embedded steel with the ASME Section XI, Subsection IWL Program, B.2.1.28. Aggressive chemical attack is an applicable aging effect requiring management for Seabrook. Further evaluation is provided in LRA Subsection 3.5.2.2.1.1. The Structures Monitoring Program, B.2.1.31, will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-2	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	Seabrook does not rely on a dewatering system for control of settlement. Cracking and distortion due to increased stress levels from settlement is not an aging effect requiring management. However, Seabrook structures are monitored for settlement as a part of the Structures Monitoring Program, B.2.1.31. Further evaluation is provided in LRA Subsection 3.5.2.2.1.2.
3.5.1-3	Concrete elements: foundation, subfoundation	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	Reduction in foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations is not an aging effect requiring management for the Seabrook Containment Structure. Further evaluation is provided in LRA Subsection 3.5.2.2.1.2.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-4	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	This item is not applicable to Seabrook. No containment components exceed the specified temperature thresholds. Further evaluation is provided in LRA Subsection 3.5.2.2.1.3.
3.5.1-5	BWR only.				
3.5.1-6	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. Seabrook manages loss of material with the ASME Section XI, Subsection IWE Program, B.2.1.27. Loss of material due to corrosion is not expected to be significant for inaccessible areas. Further evaluation is provided in LRA Subsection 3.5.2.2.1.4.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-7	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 is not applicable to Seabrook. The Seabrook Containment Building is not a pre-stressed concrete containment. Further evaluation is provided in LRA Subsection 3.5.2.2.1.5.
3.5.1-8	BWR only.				
3.5.1-9	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 for Seabrook containment penetrations that experience significant cyclic loading. Further evaluation is provided in LRA Subsection 3.5.2.2.1.6.
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 is to be evaluated	Cracking due to stress corrosion cracking is not an aging effect requiring management for these stainless steel components. Further evaluation is provided in LRA Subsection 3.5.2.2.1.7.
3.5.1-11	BWR only.				

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
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 is to be evaluated	This item is not applicable to Seabrook. Cracking due to cyclic loading is not an aging effect requiring management for the Seabrook penetration elements. Further evaluation is provided in LRA 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	Loss of material due to freeze-thaw effects is not an aging effect requiring management for Seabrook. Seabrook concrete containment is enclosed by a containment enclosure building and therefore not exposed to severe weathering conditions. Further evaluation is provided in LRA Subsection 3.5.2.2.1.9.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-15	Concrete elements: walls, dome, basemat, ring girder, buttresses, containment, 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 of ACI 201.2R	Yes, if concrete was not constructed as stated for inaccessible areas	The Seabrook AMR results conclude that cracking due to expansion and reaction with aggregate is not an aging mechanism requiring management for the containment structure at Seabrook. Concrete was constructed equivalent to recommendations in ACI 201.2R. Seabrook manages loss of material due to leaching of calcium hydroxide with the ASME Section XI, Subsection IWL Program, B.2.1.28. Further evaluation is provided in LRA 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. Seabrook manages loss of sealing with the ASME Section XI, Subsection IWE Program, B.2.1.27, and the 10 CFR 50 Appendix J Program, B.2.1.30.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	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 50 Appendix J Program, B.2.1.30, is used to manage loss of leak tightness.
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. The ASME Section XI, Subsection IWE, B.2.1.27 manages loss of material due to corrosion, 10 CFR 50 Appendix J Program, B.2.1.30, manages loss of leak tightness.
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	Not Applicable. Seabrook Station does not have prestressed tendons.

Safety Related and Other Structures; and Component Supports

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
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. Seabrook manages the aging effects with the Structures Monitoring Program, B.2.1.31. Further evaluation is provided in LRA Subsection 3.5.2.2.2.1, Item 1.
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	The Seabrook AMR results conclude that the groundwater is aggressive and chemical attack is applicable to Seabrook. Therefore, all Seabrook structural components will be monitored by the Structures Monitoring Program, B.2.1.31. Further evaluation is provided in LRA Subsection 3.5.2.2.2.1, Item 2.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
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. Seabrook manages corrosion of steel components with the Structures Monitoring Program, B.2.1.31. Further evaluation is provided in LRA Subsection 3.5.2.2.2.1, Item 3.
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. Seabrook manages Loss of material (spalling, scaling) and cracking due to freeze-thaw with the Structures Monitoring Program, B.2.1.31. Further evaluation is provided in LRA Subsection 3.5.2.2.2.1, Item 4.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
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	This item is not applicable to Seabrook. The Seabrook AMR results conclude that reaction with aggregates is not significant and the concrete was constructed consistent with the recommendations of ACI 201.2R. Nonetheless, all Seabrook structural components applicable to this item will be monitored by the Structures Monitoring Program, B.2.1.31. Further evaluation is provided in LRA Subsection 3.5.2.2.2.1, Item 5.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	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 item is not applicable to Seabrook. The Seabrook AMR results conclude that settlement is not significant. Further, a dewatering system is not relied upon for control of settlement at Seabrook. Further evaluation is provided in LRA Subsection 3.5.2.2.2.1, Item 6.
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 item is not applicable to Seabrook. The Seabrook AMR results conclude that settlement is not significant. Further, a dewatering system is not relied upon for control of settlement at Seabrook. Further evaluation is provided in LRA Subsection 3.5.2.2.2.1, Item 7.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	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 support; Steam generator supports	Lock-up due to wear	ISI (IWF) or Structures Monitoring Program	Yes, if not within the scope of ISI of Structures Monitoring Program	Lubrite® materials for nuclear applications are designed to resist deformation, have a low coefficient of friction, resist softening at elevated temperatures, resist corrosion, withstand high intensities of radiation, and will not score or mar. Further evaluation is provided in LRA Subsection 3.5.2.2.2.1, Item 8.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
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 the environment is aggressive	Yes, plant-specific if environment is aggressive	The Seabrook AMR results conclude that the groundwater is aggressive. The Structures Monitoring Program, B.2.1.31, will manage degradation of accessible and inaccessible concrete components due to corrosion of embedded steel. Further evaluation is provided in LRA Subsection 3.5.2.2.2.2. The Structures Monitoring Program, B.2.1.31, will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	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	Loss of material due to leaching of calcium hydroxide is considered to be an aging effect requiring management for Seabrook. There have been indications of leaching in below grade concrete in Seabrook structures. Further evaluation is provided in LRA Subsection 3.5.2.2.2.2, Item 5.
3.5.1-33	Group 1-5: concrete	Reduction in strength and modulus due to elevated temperature	Plant-specific	Yes, plant specific if temperature limits are exceeded	This item is not applicable to Seabrook concrete components do not exceed the temperature limits specified in NUREG-1800. Further evaluation is provided in LRA Subsection 3.5.2.2.2.3.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	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 Associated with Nuclear Power Plants and for inaccessible concrete, examination of representative 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	Concrete in inaccessible areas is evaluated for increase in Porosity and Permeability, and Loss of Material (Spalling, Scaling), Chemical Attack; Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling), Corrosion of Embedded Steel is applicable to Seabrook. Further evaluation is provided in LRA Subsection 3.5.2.2.2.4, Item 1. The Structures Monitoring Program, B.2.1.31, will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
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 is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUEG 1557)	Yes, for inaccessible areas of plants located in moderate to severe weathering conditions	Consistent with NUREG-1801. Seabrook manages Loss of material (spalling, scaling) and cracking due to freeze-thaw with the Structures Monitoring Program, B.2.1.31. Further evaluation is provided in LRA Subsection 3.5.2.2.2.4, Item 2.
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 201.2R77	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801. The Structures Monitoring Program, B.2.1.31, will manage degradation of accessible and inaccessible concrete components for cracking due to expansion / reaction with aggregates. Further evaluation is provided in LRA Subsection 3.5.2.2.2.4, Item 3.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
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 201.2R77	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801. The Structures Monitoring Program, B.2.1.31, will manage degradation of accessible and inaccessible concrete components due to Increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide Further evaluation is provided in LRA Subsection 3.5.2.2.2.4, Item 3.
3.5.1-38	Group 7, 8: Tank liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Plant-specific	Yes, plant-specific	There are no components at Seabrook that are subject to this aging effect. Further evaluation is provided in LRA Subsection 3.5.2.2.2.5.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	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, B.2.1.31, will manage degradation for components for loss of material due to general and pitting corrosion Further evaluation is provided in LRA Subsection 3.5.2.2.2.6, Item1.
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	Consistent with NUREG-1801. The Structures Monitoring Program, B.2.1.31, will manage degradation for the aging effects. Further evaluation is provided in LRA Subsection 3.5.2.2.2.6, Item 2.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
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 item is not applicable to Seabrook. Seabrook does not have any supports with vibration isolation elements which require AMR. Further evaluation is provided in LRA Subsection 3.5.2.2.2.6, Item 3.
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	This item is not applicable to Seabrook. Seabrook does not have any CLB fatigue analyses for support members, anchor bolts, or welds. Further evaluation is provided in LRA Subsection 3.5.2.2.2.7.
3.5.1-43	Group 1-3, 5, 6: all masonry block walls	Cracking due to restraint shrinkage, creep, and aggressive environment	Masonry Wall Program	No	Seabrook manages cracking of masonry block walls and masonry units with the Structures Monitoring Program, B.2.1.31. In addition, masonry wall Fire Barriers, are managed with the Fire Protection Program, B.2.1.15.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	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, B.2.1.31.
3.5.1-45	Group 6: exterior above and below ground concrete foundation; interior slab	Loss of material due to abrasion, cavitation	Inspection of Water Control Structures Associated with Nuclear Power Plants	No	Consistent with NUREG-1801. The Structures Monitoring Program, B.2.1.31, will confirm the absence of aging effects requiring management.
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	The spent fuel pool is normally maintained less than 140°F, therefore Stress Corrosion Cracking is not an aging effect that requires management. Crevice and pitting corrosion are managed by the Water Chemistry Program, B.2.1.2.
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. The Structures Monitoring Program, B.2.1.31, will confirm the absence of aging effects requiring management.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
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 Structures Monitoring Program, B.2.1.31 will confirm the absence of aging effects requiring management.
3.5.1-49	BWR only.				
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, B.2.1.31, will confirm the absence of aging effects requiring management.
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	There are no high strength bolts at Seabrook that are subject to this aging effect.
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	There are no sliding support bearings of surfaces at Seabrook that are subject to this aging effect.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	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. Seabrook manages the aging effect with the ASME Section XI, Subsection IWF Program, B.2.1.29.
3.5.1-54	Group 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. Seabrook manages the aging effect with the ASME Section XI, Subsection IWF Program, B.2.1.29.
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. Seabrook manages the aging effect of loss of material due to boric acid corrosion in steel, galvanized steel, and aluminum for all types of support members (including safety and non-safety), welds, bolted connections and support anchorage to building structure with the Boric Acid Corrosion Program, B.2.1.4.

Table 3.5.1

Summary Of Aging Management Evaluations for Structures and Structural Components

Item Number	Component	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 material function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	ISI (IWF)	No	There are no sliding support bearings of surfaces at Seabrook that are subject to this aging effect.
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 item is not applicable to Seabrook. The Seabrook AMR results do not include any supports with vibration isolation elements.
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 aging effect management or aging management program	Consistent with NUREG-1801.
3.5.1-59	Stainless steel support members; welds; bolted connections; support anchorage to building structure	None	None	NA – no aging effect management or aging management program	Consistent with NUREG-1801.

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Carbon Steel FIRE PUMPHOUSE Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
BSAS Carbon Steel FIRE PUMPHOUSE Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
BSAS Carbon Steel NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
BSAS Carbon Steel NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
BSAS Carbon Steel REVETMENT Exposed to Air Outdoor	Flood Barrier	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 503, 511
BSAS Carbon Steel REVETMENT Exposed to Air Outdoor	Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 503, 511

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Carbon Steel REVETMENT Exposed to Raw Water	Flood Barrier	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 509, 511
BSAS Carbon Steel REVETMENT Exposed to Raw Water	Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 509, 511
BSAS Carbon Steel REVETMENT Exposed to Raw Water	Flood Barrier	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 509, 511
BSAS Carbon Steel REVETMENT Exposed to Raw Water	Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 509, 511
BSAS Carbon Steel REVETMENT Exposed to Raw Water	Flood Barrier	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	H, 514
BSAS Carbon Steel REVETMENT Exposed to Raw Water	Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	H, 514

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Carbon Steel REVETMENT Exposed to Raw Water	Flood Barrier	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 509, 511
BSAS Carbon Steel REVETMENT Exposed to Raw Water	Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 509, 511
BSAS Carbon Steel STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
BSAS Carbon Steel STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
BSAS Concrete NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
BSAS Concrete NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
BSAS Concrete (Sump) FIRE PUMPHOUSE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
BSAS Concrete (Sump) FIRE PUMPHOUSE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
BSAS Concrete (Sump) STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
BSAS Concrete (Sump) STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-1 (T-18)	3.5.1-34	E, 511
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-1 (T-18)	3.5.1-34	E, 511
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-1 (T-18)	3.5.1-34	E, 511
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A6-5 (T-15)	3.5.1-35	E, 511
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A6-5 (T-15)	3.5.1-35	E, 511
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete DISCHARGE TRANSITION STRUCTURE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Increase In Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A6-6 (T-16)	3.5.1-37	E, 511
BSAS Concrete FIRE PUMPHOUSE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
BSAS Concrete FIRE PUMPHOUSE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
BSAS Concrete FIRE PUMPHOUSE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete FIRE PUMPHOUSE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete FIRE PUMPHOUSE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
BSAS Concrete FIRE PUMPHOUSE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete FIRE PUMPHOUSE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-1 (T-18)	3.5.1-34	E, 511
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-1 (T-18)	3.5.1-34	E, 511
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-1 (T-18)	3.5.1-34	E, 511
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A6-5 (T-15)	3.5.1-35	A
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A6-5 (T-15)	3.5.1-35	A
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete INTAKE TRANSITION STRUCTURE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Increase In Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A6-6 (T-16)	3.5.1-37	E, 511
BSAS Concrete Masonry Units FIRE PUMPHOUSE Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete Block	Air Indoor Uncontrolled (External)	Cracking	Fire Protection Program	III.A3-11 (T-12)	3.5.1-43	E, 513

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete Masonry Units FIRE PUMPHOUSE Exposed to Air Indoor Uncontrolled	Structural Support	Concrete Block	Air Indoor Uncontrolled (External)	Cracking	Structures Monitoring Program	III.A3-11 (T-12)	3.5.1-43	E, 511
BSAS Concrete Masonry Units NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Concrete Block	Air Indoor Uncontrolled (External)	Cracking	Structures Monitoring Program	III.A3-11 (T-12)	3.5.1-43	E, 511
BSAS Concrete Masonry Units NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Outdoor	Structural Support	Concrete Block	Air Outdoor (External)	Cracking	Structures Monitoring Program	III.A3-11 (T-12)	3.5.1-43	E, 511
BSAS Concrete NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
BSAS Concrete NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
BSAS Concrete NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete REVETMENT Below Grade	Flood Barrier	Concrete	Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
BSAS Concrete REVETMENT Below Grade	Support	Concrete	Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
BSAS Concrete REVETMENT Below Grade	Flood Barrier	Concrete	Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete REVETMENT Below Grade	Support	Concrete	Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete REVETMENT Below Grade	Flood Barrier	Concrete	Soil (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-3 (T-19)	3.5.1-34	E, 511
BSAS Concrete REVETMENT Below Grade	Support	Concrete	Soil (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-3 (T-19)	3.5.1-34	E, 511

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete REVETMENT Below Grade	Flood Barrier	Concrete	Soil (External)	Increase In Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A6-6 (T-16)	3.5.1-37	E, 509, 511
BSAS Concrete REVETMENT Below Grade	Support	Concrete	Soil (External)	Increase In Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A6-6 (T-16)	3.5.1-37	E, 509, 511
BSAS Concrete REVETMENT Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-1 (T-18)	3.5.1-34	E, 511
BSAS Concrete REVETMENT Exposed to Air Outdoor	Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A6-1 (T-18)	3.5.1-34	E, 511
BSAS Concrete REVETMENT Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511
BSAS Concrete REVETMENT Exposed to Air Outdoor	Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A6-2 (T-17)	3.5.1-36	E, 511

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete REVETMENT Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete REVETMENT Exposed to Air Outdoor	Support	Concrete	Air Outdoor (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete REVETMENT Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A6-5 (T-15)	3.5.1-35	E, 511
BSAS Concrete REVETMENT Exposed to Air Outdoor	Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A6-5 (T-15)	3.5.1-35	E, 511
BSAS Concrete STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
BSAS Concrete STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Concrete STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
BSAS Concrete STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
BSAS Concrete STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Increase In Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
BSAS Concrete STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
BSAS Rock (Riprap) REVETMENT Exposed to Air Outdoor	Flood Barrier	Rock	Air Outdoor (External)	Loss of Material, Loss of Form	Structures Monitoring Program	III.A6-9 (T-22)	3.5.1-48	E, 511

Table 3.5.2-1

Buildings, Structures Within License Renewal

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X-1 Item	Note
BSAS Rock (Riprap) REVETMENT Exposed to Air Outdoor	Support	Rock	Air Outdoor (External)	Loss of Material, Loss of Form	Structures Monitoring Program	III.A6-9 (T-22)	3.5.1-48	E, 511
BSAS Roofing For FIRE PUMPHOUSE Exposed to Air Outdoor	Structural Support	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
BSAS Roofing For NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Outdoor	Structural Support	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
BSAS Roofing For STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Outdoor	Structural Support	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
BSAS Slide Bearing (Fluorogold®) NONESSENTIAL SWITCHGEAR BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Fluorogold®	Air Indoor Uncontrolled (External)	Fretting Or Lockup	Structures Monitoring Program	III.B4-2 (TP-1)	3.5.1-52	C
BSAS Stainless Steel STEAM GENERATOR BLOWDOWN RECOVERY BUILDING Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	No Aging Management Program Required	III.B5-5 (TP-5)	3.5.1-59	A

Table 3.5.2-1
Buildings, Structures Within License Renewal
Summary of Aging Management Evaluation

Standard Notes

Note	Description
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
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.
501	Not used.
502	Aging effect includes "Fretting or Lockup" due to wear.
503	Crevice and pitting will be included along with loss of material-corrosion due to a saltwater atmosphere environment.
504	Fatigue analysis exists and TLAA applies.
505	Built-up roofing is not in GALL; III.A6-12 for elastomer-material is similar, aging effect is similar, environment is same, and AMP is Structures Monitoring.
506	Component is cementitious fire proofing/insulating material and will exhibit similar aging effects as concrete.
507	Spent Fuel Pool temperature < 60ºC (<140º F); water chemistry and temperature will be maintained by the Water Chemistry Program.
508	Cracking, loss of bond, and loss of material (spalling, scaling)/corrosion of embedded steel-is not listed in GALL III.A.6 as an aging effect for concrete in raw water. Seabrook manages this effect with Structures Monitoring Program.
509	For aging management purposes, buried, below grade, soil, and ground water/ raw & treated water environments are treated the same.
510	Reduction in concrete anchor capacity is an aging effect that is addressed in LRAM-SUPT.
511	At Seabrook Station, XI.S7 “RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” and XI.S5 “Masonry Wall Program” are combined under XI.S6 “Structures Monitoring Program”.

512 Raw water in lined & unlined concrete sumps.

513 Seabrook Station will age manage this condition through the Fire Protection Program.

514 Seabrook Station will age manage this condition through the Structures Monitoring Program.

515 Increased hardness, shrinkage, or loss of strength of elastomer seals due to weathering is addressed by GALL only for Fire Barrier seals. Seabrook Station will manage such aging effects for non-Fire Barrier elastomer seals with the Structures Monitoring Program.

516 Seabrook Station Structures Monitoring Program will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CE-Carbon Steel Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CE-Carbon Steel Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A
CNT-CE-Carbon Steel Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A, 503
CNT-CE-Fire Penetration Seal Exposed to Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness and Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A
CNT-CE-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-4 (T-05)	3.5.1-31	A
CNT-CE-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-4 (T-05)	3.5.1-31	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CE-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CE-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CE-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-5 (T-07)	3.5.1-31	A
CNT-CE-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-5 (T-07)	3.5.1-31	A
CNT-CE-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A1-7 (T-02)	3.5.1-32	A, 509
CNT-CE-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A1-7 (T-02)	3.5.1-32	A, 509

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CE-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CE-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CE-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CE-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CE-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CE-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CE-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CE-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CE-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CE-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CE-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Structural Pressure Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Structural Pressure Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Structural Pressure Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Structural Pressure Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CE-Reinforced Concrete Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CE-Stainless Steel Exposed to Air Outdoor	Structural Support	Stainless Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.B2-7 (TP-6)	3.5.1-50	A
CNT-CEVA-Built-Up Roofing Exposed to Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	505, H
CNT-CEVA-Carbon Steel Door Exposed to Air with Borated Water Leakage	HELB Shielding	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CEVA-Carbon Steel Door Exposed to Air with Borated Water Leakage	Shelter, Protection	Steel	Air w/Borated Water Leakage (External	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CEVA-Carbon Steel Door Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Carbon Steel Door Exposed to Air Indoor Uncontrolled	HELB Shielding	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A
CNT-CEVA-Carbon Steel Door Exposed to Air Indoor Uncontrolled	Shelter, Protection	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A
CNT-CEVA-Carbon Steel Door Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A
CNT-CEVA-Carbon Steel Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CEVA-Carbon Steel Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CEVA-Carbon Steel Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Carbon Steel Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A
CNT-CEVA-Carbon Steel Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A, 503
CNT-CEVA-Carbon Steel Fire Door Exposed to Air with Borated Water Leakage	Fire Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CEVA-Carbon Steel Fire Door Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CEVA-Carbon Steel Fire Door Exposed to Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A
CNT-CEVA-Carbon Steel Fire Door Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Carbon Steel Fire Door Exposed to Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A
CNT-CEVA-Carbon Steel Fire Door Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A
CNT-CEVA-Carbon Steel Tech Spec Door Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CEVA-Carbon Steel Tech Spec Door Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CEVA-Carbon Steel Tech Spec Door Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A
CNT-CEVA-Carbon Steel Tech Spec Door Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Elastomeric Pressure Seal and Caulk Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness and Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
CNT-CEVA-Elastomers Exposed to Air Outdoor	Expansion / Separation	Elastomer	Air Outdoor (External)	Increased Hardness and Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
CNT-CEVA-Fire Penetration Seal Exposed to Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness and Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A
CNT-CEVA-Fire Penetration Seal Exposed to Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness and Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
CNT-CEVA-Penetration Seal Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness and Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
CNT-CEVA-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-4 (T-05)	3.5.1-31	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-4 (T-05)	3.5.1-31	A
CNT-CEVA-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-5 (T-07)	3.5.1-31	A
CNT-CEVA-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-5 (T-07)	3.5.1-31	A
CNT-CEVA-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A1-7 (T-02)	3.5.1-32	A, 509

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A1-7 (T-02)	3.5.1-32	A, 509
CNT-CEVA-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CEVA-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CEVA-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Structural Pressure Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Structural Pressure Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Structural Pressure Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Flood Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CEVA-Reinforced Concrete Exposed to Air Outdoor	Structural Pressure Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
CNT-CEVA-Tech Spec Seal Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness and Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
CNT-CEVA-Tech Spec Seal Exposed to Air Outdoor	Structural Pressure Barrier	Elastomer	Air Outdoor (External)	Increased Hardness and Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
CNT-CEVA-Thermal Insulation Aluminum Jacketing in Air with Borated Water Leakage	Structural Support	Aluminum	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-6 (TP-3)	3.5.1-55	A
CNT-CI-Carbon Steel Door Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (TP-25)	3.5.1-55	A
CNT-CI-Carbon Steel Door Exposed to Air Indoor Uncontrolled	Shelter, Protection	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A4-5 (T-11)	3.5.1-25	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CI-Carbon Steel Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (TP-25)	3.5.1-55	A
CNT-CI-Carbon Steel Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A4-5 (T-11)	3.5.1-25	A
CNT-CI-Conduit Fire Wrap Exposed to Air Indoor Uncontrolled	Fire Barrier	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B1.2-7 (TP-5)	3.5.1-59	A
CNT-CI-Conduit Fire Wrap Exposed to Air with Borated Water Leakage	Fire Barrier	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CI-Heat Shield Exposed to Air with Borated Water Leakage	Fire Barrier	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CI-Radiant Heat Shield Exposed to Air Indoor Uncontrolled	Fire Barrier	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B1.2-7 (TP-5)	3.5.1-59	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A4-3 (T-04)	3.5.1-23	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Flood Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A4-3 (T-04)	3.5.1-23	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Missile Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A4-3 (T-04)	3.5.1-23	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A4-3 (T-04)	3.5.1-23	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A4-2 (T-03)	3.5.1-27	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Flood Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A4-2 (T-03)	3.5.1-27	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Missile Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A4-2 (T-03)	3.5.1-27	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A4-2 (T-03)	3.5.1-27	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A4-4 (T-06)	3.5.1-24	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Flood Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A4-4 (T-06)	3.5.1-24	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Missile Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A4-4 (T-06)	3.5.1-24	A
CNT-CI-Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A4-4 (T-06)	3.5.1-24	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CI-Stainless Steel Exposed to Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B1.29 (TP-4)	3.5.1-59	A
CNT-CI-Stainless Steel Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B1.2-7 (TP-5)	3.5.1-59	A
CNT-CI-Stainless Steel Raw Water	Structural Support	Stainless Steel	Raw Water (External)	Loss of Materia	Structures Monitoring Program	V.D1-15 (E-01)	3.2.1-7	E, 514
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Flood Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Missile Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Flood Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Missile Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Flood Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Missile Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Flood Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Missile Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Flood Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Missile Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shelter, Protection	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS- Reinforced Concrete Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516
CNT-CS-Airlock Hatch Sight Glass Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Glass	Air Indoor Uncontrolled (External)	None	None	V.F-6 (EP-15)	3.2.1-52	A
CNT-CS-Carbon Steel Electrical Penetration Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CS-Carbon Steel Electrical Penetration Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CS-Carbon Steel Electrical Penetration Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-1 (C-12)	3.5.1-18	A
CNT-CS-Carbon Steel Electrical Penetration Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-1 (C-12)	3.5.1-18	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS-Carbon Steel Equipment Hatch Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CS-Carbon Steel Equipment Hatch Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CS-Carbon Steel Equipment Hatch Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-6 (C-16)	3.5.1-18	A
CNT-CS-Carbon Steel Equipment Hatch Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-6 (C-16)	3.5.1-18	A
CNT-CS-Carbon Steel Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CS-Carbon Steel Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS-Carbon Steel Exposed to Air with Borated Water Leakage for HVAC Penetrations	Structural Pressure Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CS-Carbon Steel Exposed to Air with Borated Water Leakage for HVAC Penetrations	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CS-Carbon Steel Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A1-11 (C-09)	3.5.1-6	A
CNT-CS-Carbon Steel Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A1-11 (C-09)	3.5.1-6	A
CNT-CS-Carbon Steel Exposed to Air Indoor Uncontrolled For HVAC Penetrations	Structural Pressure Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-1 (C-12)	3.5.1-18	A
CNT-CS-Carbon Steel Exposed to Air Indoor Uncontrolled For HVAC Penetrations	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-1 (C-12)	3.5.1-18	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS-Carbon Steel Mechanical (Piping) Penetration Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CS-Carbon Steel Mechanical (Piping) Penetration Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
CNT-CS-Carbon Steel Mechanical (Piping) Penetration Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-1 (C-12)	3.5.1-18	A
CNT-CS-Carbon Steel Mechanical (Piping) Penetration Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-1 (C-12)	3.5.1-18	A
CNT-CS-Carbon Steel Personnel Hatch Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (CT-25)	3.5.1-55	A
CNT-CS-Carbon Steel Personnel Hatch Exposed to Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (CT-25)	3.5.1-55	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS-Carbon Steel Personnel Hatch Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-6 (C-16)	3.5.1-18	A
CNT-CS-Carbon Steel Personnel Hatch Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWE Program	II.A3-6 (C-16)	3.5.1-18	A
CNT-CS-Elastomers Electrical Penetration Assembly Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Elastomer	Air Indoor Uncontrolled (External)	Loss of Sealing, Leakage Through Containment	ASME Section XI, Subsection IWE Program	II.A3-7 (C-18)	3.5.1-16	A
CNT-CS-Mechanical (Piping) Penetration Stainless Steel Flued Head Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A
CNT-CS-Mechanical (Piping) Penetration Stainless Steel Flued Head Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A
CNT-CS-Mechanical (Piping) Penetration Stainless Steel Flued Head Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS-Mechanical (Piping) Penetration Stainless Steel Flued Head Exposed to Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CS-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A
CNT-CS-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-7 (C-05)	3.5.1-1	A
CNT-CS-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A
CNT-CS-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Expansion and Cracking	ASME Section XI, Subsection IWL Program	II.A1-3 (C-04)	3.5.1-15	A
CNT-CS-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL Program	II.A1-4 (C-03)	3.5.1-1	A, 516
CNT-CS-Reinforced Concrete Below Grade	Shelter, Protection	Concrete	Soil (External)	Increase in Porosity and Permeability, Loss of Strength	ASME Section XI, Subsection IWL Program	II.A1-6 (C-02)	3.5.1-15	A, 509, 516
CNT-CS-Reinforced Concrete Below Grade	Structural Support	Concrete	Soil (External)	Increase in Porosity and Permeability, Loss of Strength	ASME Section XI, Subsection IWL Program	II.A1-6 (C-02)	3.5.1-15	A, 509, 516
CNT-CS-Stainless Steel Electrical Penetration Assembly Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CS-Stainless Steel Electrical Penetration Assembly Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CS-Stainless Steel Electrical Penetration Assembly Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS-Stainless Steel Electrical Penetration Assembly Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A
CNT-CS-Stainless Steel Exposed to Air with Borated Water Leakage	Shielding	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CS-Stainless Steel Exposed to Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CS-Stainless Steel Exposed to Air Indoor Uncontrolled	Shielding	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A
CNT-CS-Stainless Steel Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A
CNT-CS-Stainless Steel Fuel Transfer Tube Bellows Exposed to Air with Borated Water Leakage	Expansion / Separation	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS-Stainless Steel Fuel Transfer Tube Bellows Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CS-Stainless Steel Fuel Transfer Tube Bellows Exposed to Air Indoor Uncontrolled	Expansion / Separation	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A
CNT-CS-Stainless Steel Fuel Transfer Tube Bellows Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A
CNT-CS-Stainless Steel Fuel Transfer Tube Exposed to Air with Borated Water Leakage	Structural Pressure Barrier	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CS-Stainless Steel Fuel Transfer Tube Exposed to Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-4)	3.5.1-59	A
CNT-CS-Stainless Steel Fuel Transfer Tube Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2

Containment Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
CNT-CS-Stainless Steel Fuel Transfer Tube Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	Cracking	ASME Section XI, Subsection IWE Program	II.A3-2 (C-15)	3.5.1-10	A
CNT-CS-Thermal Insulation Stainless Steel Jacketing in Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A

Containment Enclosure (CE), Containment Enclosure Ventilation Area (CEVA), Containment Internals (CI), Containment Structure (CS)

Table 3.5.2-2
Containment Structures
Summary of Aging Management Evaluation

Standard Notes

Note	Description
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
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.
501	Not used.
502	Aging effect includes "Fretting or Lockup" due to wear.
503	Crevice and pitting will be included along with loss of material-corrosion due to a saltwater atmosphere environment.
504	Fatigue analysis exists and TLAA applies.
505	Built-up roofing is not in GAL; III.A6-12 is for elastomer-material is similar, aging effect is similar, environment is same, and AMP is Structures Monitoring.
506	Component is cementitious fire proofing/insulating material and will exhibit similar aging effects as concrete.
507	Spent Fuel Pool temperature < 60ºC (<140º F), water chemistry and temperature will be maintained by the Water Chemistry Program.
508	Cracking, loss of bond, and loss of material (Spalling, Scaling)/corrosion of embedded steel-is not listed in GALL III.A.6 as an aging effect for concrete in raw water. Seabrook manages this effect with Structures Monitoring Program.
509	For aging management purposes, buried, below grade, soil, and ground water/ raw & treated water environments are treated the same.
510	Reduction in concrete anchor capacity is an aging effect that is addressed in LRAM-SUPT.

511 At Seabrook Station, XI,.S7 “RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” and XI,.S5 “Masonry Wall Program” are combined under XI,.S6 “Structures Monitoring Program”.

512 Raw water in lined & unlined concrete sumps.

513 Seabrook Station will age manage this condition through the Fire Protection Program.

514 Seabrook Station will age manage this condition through the Structures Monitoring Program.

515 Increased hardness, shrinkage, or loss of strength of elastomer seals due to weathering is addressed by GALL only for Fire Barrier seals. Seabrook Station will manage such aging effects for non-Fire Barrier elastomer seals with the Structures Monitoring Program.

516 Seabrook Station Structures Monitoring Program will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-CBS-CR-18-A Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-CBS-CR-18-A Radioactive Pipe Tunnel Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load “Related to Refueling” Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CBS-CR-18-A Radioactive Pipe Tunnel Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-CBS-CR-18-A Radioactive Pipe Tunnel Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-CBS-CR-18-B Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-CBS-CR-18-B Radioactive Pipe Tunnel Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-CBS-CR-18-B Radioactive Pipe Tunnel Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-CBS-CR-18-B Radioactive Pipe Tunnel Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-CC-CR-15-A Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-CC-CR-15-A CC Water Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CC-CR-15-A CC Water Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-CC-CR-15-A CC Water Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-07)	3.3.1-74	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-CC-CR-15-B CC Water Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CC-CR-15-B CC Water Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-CC-CR-15-B CC Water Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-07)	3.3.1-74	A
1-CC-CR-15-B Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-CC-CR-41 CC Heat Exchanger Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CC-CR-41 CC Heat Exchanger Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-CC-CR-41 CC Heat Exchanger Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-CC-CR-41 Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-CS-CR-13 CVCS Heat Exchanger Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CS-CR-13 CVCS Heat Exchanger Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-CS-CR-13 CVCS Heat Exchanger Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-CS-CR-13 Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-CS-CR-14-A Charging Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CS-CR-14-A Charging Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-CS-CR-14-A Charging Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-CS-CR-14-A Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-CS-CR-14-B Charging Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CS-CR-14-B Charging Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-CS-CR-14-B Charging Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-CS-CR-14-B Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-CS-CR-14-C Charging Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CS-CR-14-C Charging Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-CS-CR-14-C Charging Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-CS-CR-14-C Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-CS-CR-5 Filter Cask Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CS-CR-5 Filter Cask Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-CS-CR-5 Filter Cask Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-CS-CR-5 Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-CS-CR-6 Boric Acid Batching Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-CS-CR-6 Boric Acid Batching Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-CS-CR-6 Boric Acid Batching Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-CS-CR-6 Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-DG-CR-28-A Diesel Generator Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-DG-CR-28-A Diesel Generator Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-DG-CR-28-A Diesel Generator Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-DG-CR-28-B Diesel Generator Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-DG-CR-28-B Diesel Generator Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-DG-CR-28-B Diesel Generator Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-FH-RE-1 Crane Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.3.1-55	A
1-FH-RE-1 Spent Fuel Cask Handling Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-FH-RE-1 Spent Fuel Cask Handling Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-FH-RE-1 Spent Fuel Cask Handling Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-FH-RE-2 Bridge & Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-FH-RE-2 Spent Fuel Bridge & Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-FH-RE-2 Spent Fuel Bridge & Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-FH-RE-2 Spent Fuel Bridge & Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-FH-RE-24-E Radial Arm Stud Tensioner Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-FH-RE-24-E Radial Arm Stud Tensioner Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-FH-RE-24-E Radial Arm Stud Tensioner Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-FH-RE-24-E Tensioner Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-FH-RE-24-F Radial Arm Stud Tensioner Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-FH-RE-24-F Radial Arm Stud Tensioner Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-FH-RE-24-F Radial Arm Stud Tensioner Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-FH-RE-24-F Tensioner Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-FH-RE-24-G Radial Arm Stud Tensioner Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-FH-RE-24-G Radial Arm Stud Tensioner Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-FH-RE-24-G Radial Arm Stud Tensioner Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-FH-RE-24-G Tensioner Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-FH-RE-5 Manipulator Crane Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-FH-RE-5 Refueling Machine or Manipulator Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-FH-RE-5 Refueling Machine or Manipulator Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-FH-RE-5 Refueling Machine or Manipulator Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-FW-CR-27 Emergency Feed Pump Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-FW-CR-27 Emergency Feed Pump Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-FW-CR-27 Emergency Feed Pump Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-MM-CR-3 Polar Gantry Crane Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-MM-CR-3 Polar Gantry Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-MM-CR-3 Polar Gantry Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-MM-CR-3 Polar Gantry Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-MM-CR-49 Jib Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-MM-CR-49 Personnel Hatch Jib Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-MM-CR-49 Personnel Hatch Jib Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-MM-CR-49 Personnel Hatch Jib Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-MS-CR-25-A MS/FW West Pipechase Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-MS-CR-25-A MS/FW West Pipechase Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-MS-CR-25-A MS/FW West Pipechase Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-MS-CR-25-B MS/FW East Pipechase Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-MS-CR-25-B MS/FW East Pipechase Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-MS-CR-25-B MS/FW East Pipechase Service Crane Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-SI-CR-40-A Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
1-SI-CR-40-A Safety Injection Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-SI-CR-40-A Safety Injection Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-SI-CR-40-A Safety Injection Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
1-SI-CR-40-B Monorail Hoist Carbon Steel In Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.3.1-55	A

Table 3.5.2-3

Fuel Handling and Overhead Cranes

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
1-SI-CR-40-B Safety Injection Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
1-SI-CR-40-B Safety Injection Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.B-3 (A-07)	3.3.1-73	E, 514
1-SI-CR-40-B Safety Injection Pump Service Monorail Hoist Carbon Steel In Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A

Table 3.5.2-3
Fuel Handling and Overhead Cranes
Summary of Aging Management Evaluation

Standard Notes

Note	Description
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
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.
501	Not used.
502	Aging effect includes "Fretting or Lockup" due to wear.
503	Crevice and pitting will be included along with loss of material-corrosion due to a saltwater atmosphere environment.
504	Fatigue analysis exists and TLAA applies.
505	Built-up roofing is not in GALL; III.A6-12 is for elastomer-material is similar, aging effect is similar, environment is same, and AMP is Structures Monitoring.
506	Component is cementitious fire proofing/insulating material and will exhibit similar aging effects as concrete.
507	Spent Fuel Pool temperature < 60ºC (<140º F), water chemistry and temperature will be maintained by the Water Chemistry Program.
508	Cracking, loss of bond, and loss of material (spalling, scaling)/corrosion of embedded steel-is not listed in GALL III.A.6 as an aging effect for concrete in raw water. Seabrook manages this effect with Structures Monitoring Program.
509	For aging management purposes, buried, below grade, soil, and ground water/ raw & treated water environments are treated the same.
510	Reduction in concrete anchor capacity is an aging effect that is addressed in LRAM-SUPT.
511	At Seabrook Station, XI.S7 "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" and XI.S5 "Masonry Wall Program" are combined under XI.S6 "Structures Monitoring Program".
512	Raw water in lined & unlined concrete sumps.

513 Seabrook Station will age manage this condition through the Fire Protection Program.

514 Seabrook Station will age manage this condition through the Structures Monitoring Program.

515 Increased hardness, shrinkage, or loss of strength of elastomer seals due to weathering is addressed by GALL only for Fire Barrier seals. Seabrook Station will manage such aging effects for non-Fire Barrier elastomer seals with the Structures Monitoring Program.

516 Seabrook Station Structures Monitoring Program will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Aluminum STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Aluminum	Air Outdoor (External)	Crack Initiation and Growth	Structures Monitoring Program	III.B2-7 (Tp-6)	3.5.1-50	H, 514
MYS - Aluminum STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Aluminum	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.B2-7 (TP-6)	3.5.1-50	A
MYS - Carbon Steel CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
MYS - Carbon Steel CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Weather	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
MYS - Carbon Steel Door ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
MYS - Carbon Steel Door ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Carbon Steel Door STATION BLACKOUT STRUCTURES Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
MYS - Carbon Steel Door STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
MYS - Carbon Steel ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
MYS - Carbon Steel ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
MYS - Carbon Steel NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
MYS - Carbon Steel NON SAFETY RELATED ELECTRICAL MANHOLES Exposed to Weather	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Carbon Steel SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
MYS - Carbon Steel SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Exposed to Weather	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
MYS - Carbon Steel SERVICE WATER ACCESS VAULT Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
MYS - Carbon Steel STATION BLACKOUT STRUCTURES Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
MYS - Carbon Steel STATION BLACKOUT STRUCTURES Exposed to Weather	Shelter, Protection	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
MYS - Carbon Steel STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Fire Protection Program	III.A3-10 (T-06)	3.5.1-24	E, 513
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Fire Protection Program	III.A3-10 (T-06)	3.5.1-24	E, 513
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete Masonry Unit (CMU) STATION BLACKOUT STRUCTURES Exposed to Weather	Fire Barrier	Concrete Block	Air Outdoor (External)	Cracking	Fire Protection Program	III.A3-11 (T-12)	3.5.1-43	E, 513

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete Masonry Unit (CMU) STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Concrete BLOCK	Air Outdoor (External)	Cracking	Fire Protection Program	III.A3-11 (T-12)	3.5.1-43	E, 513
MYS - Concrete Masonry Unit (CMU) STATION BLACKOUT STRUCTURES Exposed to Weather	Fire Barrier	Concrete Block	Air Outdoor (External)	Cracking	Structures Monitoring Program	III.A3-11 (T-12)	3.5.1-43	A, 511
MYS - Concrete Masonry Unit (CMU) STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Concrete BLOCK	Air Outdoor (External)	Cracking	Structures Monitoring Program	III.A3-11 (T-12)	3.5.1-43	A, 511
MYS - Concrete NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
MYS - Concrete NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
MYS - Concrete NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
MYS - Concrete NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete NON SAFETY RELATED MANHOLES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete NON SAFETY RELATED MANHOLES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete NON SAFETY RELATED MANHOLES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete NON SAFETY RELATED MANHOLES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
MYS - Concrete SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
MYS - Concrete SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
MYS - Concrete SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete SAFETY RELATED MANHOLES Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete SAFETY RELATED MANHOLES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete SAFETY RELATED MANHOLES Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete SAFETY RELATED MANHOLES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete SAFETY RELATED MANHOLES Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete SAFETY RELATED MANHOLES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete SAFETY RELATED MANHOLES Exposed to Weather	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete SAFETY RELATED MANHOLES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete SERVICE WATER ACCESS VAULT Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete SERVICE WATER ACCESS VAULT Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete SERVICE WATER ACCESS VAULT Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete SERVICE WATER ACCESS VAULT Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
MYS - Concrete SERVICE WATER ACCESS VAULT Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete SERVICE WATER ACCESS VAULT Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
MYS - Concrete SERVICE WATER ACCESS VAULT Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
MYS - Concrete SERVICE WATER ACCESS VAULT Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete SERVICE WATER ACCESS VAULT Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
MYS - Concrete SERVICE WATER ACCESS VAULT Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete STATION BLACKOUT STRUCTURES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete STATION BLACKOUT STRUCTURES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete STATION BLACKOUT STRUCTURES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
MYS - Concrete STATION BLACKOUT STRUCTURES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
MYS - Concrete STATION BLACKOUT STRUCTURES Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
MYS - Concrete STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
MYS - Concrete STATION BLACKOUT STRUCTURES Exposed to Weather	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
MYS - Concrete Sump CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
MYS - Concrete Sump CONTROL ROOM MAKEUP AIR INTAKE STRUCTURE Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - Concrete Sump NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
MYS - Concrete Sump NON SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Concrete Sump SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
MYS - Concrete Sump SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
MYS - EPDM Roof ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	A, 505
MYS - EPDM Roof STATION BLACKOUT STRUCTURES Exposed to Weather	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	A, 505
MYS - Penetration Seal ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness and Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
MYS - Seismic Isolation Joint SAFETY RELATED ELECTRICAL DUCT BANKS/MANHOLES Air Indoor Uncontrolled	Expansion/ Separation	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness and Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
MYS - Stainless Steel ENCLOSURE FOR CONDENSATE STORAGE TANK Exposed to Weather	Structural Support	Stainless Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.B2-7 (TP-6)	3.5.1-50	A

Table 3.5.2-4

Miscellaneous Yard Structures

Summary of Aging Management Evaluation

Standard Notes

Note	Description
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
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.
501	Not used.
502	Aging effect includes "Fretting or Lockup" due to wear.
503	Crevice and pitting will be included along with loss of material-corrosion due to a saltwater atmosphere environment.
504	Fatigue analysis exists and TLAA applies.
505	Built-up roofing is not in GALL; III.A6-12 is for elastomer-material is similar, aging effect is similar, environment is same, and AMP is Structures Monitoring.
506	Component is cementitious fire proofing/insulating material and will exhibit similar aging effects as concrete.
507	Spent Fuel Pool temperature < 60ºC (<140º F); water chemistry and temperature will be maintained by the Water Chemistry Program.
508	Cracking, loss of bond, and loss of material (spalling, scaling)/corrosion of embedded steel-is not listed in GALL III.A.6 as an aging effect for concrete in raw water. Seabrook manages this effect with Structures Monitoring Program.
509	For aging management purposes, buried, below grade, soil, and ground water/ raw & treated water environments are treated the same.
510	Reduction in concrete anchor capacity is an aging effect that is addressed in LRAM-SUPT.

511 At Seabrook Station, XI.S7 “RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” and XI.S5 “Masonry Wall Program” are combined under XI.S6 “Structures Monitoring Program”.

512 Raw water in lined & unlined concrete sumps.

513 Seabrook Station will age manage this condition through the Fire Protection Program.

514 Seabrook Station will age manage this condition through the Structures Monitoring Program.

515 Increased hardness, shrinkage, or loss of strength of elastomer seals due to weathering is addressed by GALL only for Fire Barrier seals. Seabrook Station will manage such aging effects for non-Fire Barrier elastomer seals with the Structures Monitoring Program.

516 Seabrook Station Structures Monitoring Program will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - (Structural) Fire Proofing - CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Non-Metallic Fire-Proofing	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	C, 506
PST - (Structural) Fire Proofing - CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Non-Metallic Fire-Proofing	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.G-29 (A-91)	3.3.1-67	C, 506
PST - (Structural) Fire Proofing - CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Non-Metallic Fire-Proofing	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	C, 506
PST - (Structural) Fire Proofing - CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Non-Metallic Fire-Proofing	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.G-29 (A-91)	3.3.1-67	C, 506
PST - Built-Up Roofing - CDG- Exposed to Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Built-Up Roofing - EFP- Exposed to Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
PST - Built-Up Roofing - FSB- Exposed to Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
PST - Built-Up Roofing - PAB- Exposed to Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
PST - Built-Up Roofing - PCEW- Exposed to Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
PST - Built-Up Roofing - PHA- Exposed to Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Built-Up Roofing - TFA- Exposed to Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
PST - Built-Up Roofing - WPB- Exposed to Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
PST - Carbon Steel -CDG- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A
PST - Carbon Steel -CDG- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel - CEHMS- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel Door - CDG- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A
PST - Carbon Steel Door - CDG- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A1-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel Door - EFP- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel Door - EFP- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel Door - FSB- Exposed to Air Indoor Uncontrolled	HELB Shielding	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A5-12 (T-11)	3.5.1-25	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel Door - FSB- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A5-12 (T-11)	3.5.1-25	A
PST - Carbon Steel Door - FSB- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A5-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel Door - FSB- in Air with Borated Water Leakage	HELB Shielding	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel Door - FSB- in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel Door - PAB- Exposed to Air Indoor Uncontrolled	HELB Shielding	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel Door - PAB- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel Door - PAB- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel Door - PAB- in Air with Borated Water Leakage	HELB Shielding	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel Door - PAB- in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel Door - PCEW- Exposed to Air Indoor Uncontrolled	HELB Shielding	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel Door - PCEW- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel Door - PCEW- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel Door - WPB- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel Door - WPB- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel Door - WPB- in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel -EFP- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel -EFP- Exposed to Air Outdoor	Shelter, Protection	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel -EFP- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel Fire Door -CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A
PST - Carbon Steel Fire Door -EFP- Exposed to Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel Fire Door -FSB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A
PST - Carbon Steel Fire Door -FSB- in Air with Borated Water Leakage	Fire Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel Fire Door -PAB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A
PST - Carbon Steel Fire Door -PAB- in Air with Borated Water Leakage	Fire Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel Fire Door -PCEW- Exposed to Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel Fire Door -WPB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A
PST - Carbon Steel Fire Door -WPB- in Air with Borated Water Leakage	Fire Barrier	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel -FSB- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A5-12 (T-11)	3.5.1-25	A
PST - Carbon Steel -FSB- in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel -PAB- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel -PAB- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel -PAB- in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel -PCEW- Exposed to Air Indoor Uncontrolled	Flood Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel -PCEW- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel -PCEW- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel -PHA- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel -PHA- Exposed to Air Outdoor	Shelter, Protection	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel -PHA- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel -TFA- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel -TFA- Exposed to Air Outdoor	Shelter, Protection	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel -TFA- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel -TFA- in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Carbon Steel -WPB- Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
PST - Carbon Steel -WPB- Exposed to Air Outdoor	Shelter, Protection	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
PST - Carbon Steel -WPB- Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Carbon Steel -WPB- in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-11 (T-25)	3.5.1-55	A
PST - Conduit Fire Wrap – CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Aluminum	Air Indoor Uncontrolled (External)	None	None	III.B2-4 (TP-8)	3.5.1-58	A
PST - Conduit Fire Wrap – PAB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Aluminum	Air Indoor Uncontrolled (External)	None	None	III.B2-4 (TP-8)	3.5.1-58	A
PST - Conduit Fire Wrap – PAB- in Air with Borated Water Leakage	Fire Barrier	Aluminum	Air w/Borated Water Leakage (External))	Loss of Material	Boric Acid Program	III.B2-6 (TP-3)	3.5.1-55	A
PST - Conduit Fire Wrap – WPB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Aluminum	Air Indoor Uncontrolled (External)	None	None	III.B2-4 (TP-8)	3.5.1-58	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Conduit Fire Wrap – WPB- in Air with Borated Water Leakage	Fire Barrier	Aluminum	Air w/Borated Water Leakage (External))	Loss of Material	Boric Acid Program	III.B2-6 (TP-3)	3.5.1-55	A
PST - Elastomers -CDG- Exposed to Air Indoor Uncontrolled	Control Bldg Habitability	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
PST - Elastomers -CDG- Exposed to Air Indoor Uncontrolled	Flood Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
PST - Elastomers -CDG- Exposed to Air Outdoor	Expansion/ Separation	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -CDG- Exposed to Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Elastomers -EFP-Exposed to Air Outdoor	Expansion/ Separation	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -EFP-Exposed to Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -FSB-Exposed to Air Outdoor	Expansion/ Separation	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -FSB-Exposed to Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -PAB-Exposed to Air Outdoor	Expansion/ Separation	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Elastomers -PAB- Exposed to Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -PCEW- Exposed to Air Outdoor	Expansion/ Separation	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -PCEW- Exposed to Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -PHA- Exposed to Air Outdoor	Expansion/ Separation	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -PHA- Exposed to Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Elastomers -TFA- Exposed to Air Outdoor	Expansion/ Separation	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -TFA- Exposed to Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -WPB- Exposed to Air Outdoor	Expansion/ Separation	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Elastomers -WPB- Exposed to Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Fire Penetration Seal -CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Fire Penetration Seal -EFP- Exposed to Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A
PST - Fire Penetration Seal -FSB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A
PST - Fire Penetration Seal -PAB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A
PST - Fire Penetration Seal -PCEW- Exposed to Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A
PST - Fire Penetration Seal -WPB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Lubrite® Plate -PAB- Exposed to Air Indoor Uncontrolled	Structural Support	Lubrite®	Air Indoor Uncontrolled (External)	Loss of Mechanical Function	Structures Monitoring Program	III.B2-2 (TP-1)	3.5.1-52	A
PST - Reinforced Concrete - CDG- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - CDG- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - CDG- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - CDG- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - CDG- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - CDG- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - CDG- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A1-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - CDG- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A1-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - CDG- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - CDG- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - CDG- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - CDG- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - CDG- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - CDG- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - CDG- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - CDG- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - CDG- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - CDG- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - CDG- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A1-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - CDG- Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A1-4 (T-05)	3.5.1-31	A, 512

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - CDG- Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A1-2 (T-03)	3.5.1-27	A, 512
PST - Reinforced Concrete - CEHMS- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - CEHMS- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - CEHMS- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - CEHMS- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - CEHMS- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - CEHMS- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - CEHMS- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - CEHMS- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - CEHMS- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - EFP- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - EFP- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - EFP- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - EFP- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - EFP- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - EFP- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - EFP- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - EFP- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - EFP- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - EFP- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - EFP- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - EFP- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - EFP- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - EFP- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - EFP- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - EFP- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - EFP- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - EFP- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - EFP- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - EFP- Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 512
PST - Reinforced Concrete - EFP- Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 512

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - FSB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - FSB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - FSB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A5-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - FSB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A5-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - FSB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-5 (T-07)	3.5.1-31	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

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Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - FSB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - FSB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A5-7 (T-02)	3.5.1-31	A, 509
PST - Reinforced Concrete - FSB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A5-7 (T-02)	3.5.1-31	A, 509
PST - Reinforced Concrete - FSB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A5-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - FSB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A5-6 (T-01)	3.5.1-26	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

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Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-9 (T-04)	3.5.1-23	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A5-2 (T-03)	3.5.1-27	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A5-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A5-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - FSB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - FSB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - FSB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - FSB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A5-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - FSB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A5-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - FSB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - FSB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - FSB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A5-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - FSB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A5-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - FSB- Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A5-4 (T-05)	3.5.1-31	A, 512
PST - Reinforced Concrete - FSB- Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A5-2 (T-03)	3.5.1-27	A, 512

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PAB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - PAB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - PAB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PAB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PAB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PAB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - PAB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - PAB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - PAB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - PAB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PAB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PAB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PAB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PAB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PAB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PAB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PAB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PAB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - PAB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - PCEW- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - PCEW- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PCEW- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PCEW- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PCEW- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - PCEW- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - PCEW- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PCEW- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - PCEW- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - PCEW- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	HELB Shielding	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PCEW- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PCEW- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PCEW- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PCEW- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PCEW- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PCEW- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PCEW- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PCEW- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PCEW- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - PCEW- Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 512
PST - Reinforced Concrete - PCEW- Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 512
PST - Reinforced Concrete - PHA- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - PHA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PHA- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PHA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PHA- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - PHA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - PHA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PHA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - PHA- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - PHA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

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Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PHA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PHA- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - PHA- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

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Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - PHA- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - PHA- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - TFA- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - TFA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - TFA- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

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Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - TFA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - TFA- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - TFA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - TFA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - TFA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

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Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - TFA- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - TFA- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

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Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - TFA- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - TFA- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - TFA- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - TFA- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - TFA- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - TFA- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - TFA- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - TFA- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - TFA- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - WPB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - WPB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
PST - Reinforced Concrete - WPB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - WPB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - WPB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - WPB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
PST - Reinforced Concrete - WPB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - WPB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
PST - Reinforced Concrete - WPB- Below Grade	Flood Barrier	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - WPB- Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Shielding	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - WPB- Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - WPB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - WPB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
PST - Reinforced Concrete - WPB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - WPB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
PST - Reinforced Concrete - WPB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Reinforced Concrete - WPB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
PST - Reinforced Concrete - WPB- Exposed to Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Reinforced Concrete - WPB- Exposed to Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
PST - Stainless Steel -CDG- Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B2-8 (TP-5)	3.5.1-59	C
PST - Stainless Steel -CDG- Exposed to Raw Water	Shelter, Protection	Stainless Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	VII.H2-18 (Ap-55)	3.3.1-80	E, 512

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Stainless Steel - CEHMS- Exposed to Air Outdoor	Structural Support	Stainless Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.B2-7 (TP-6)	3.5.1-50	C
PST - Stainless Steel -FSB- Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B2-8 (TP-5)	3.5.1-59	C
PST - Stainless Steel -FSB- Exposed to Raw Water	Shelter, Protection	Stainless Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	VII.H2-18 (Ap-55)	3.3.1-80	E, 512
PST - Stainless Steel -FSB- Exposed to Treated Borated Water	Shelter, Protection	Stainless Steel	Treated Borated Water (External)	Cracking	Water Chemistry Program	III.A5-13 (T-14)	3.5.1-46	A, 507
PST - Stainless Steel -FSB- Exposed to Treated Borated Water	Shelter, Protection	Stainless Steel	Treated Borated Water (External)	Loss of Material	Water Chemistry Program	III.A5-13 (T-14)	3.5.1-46	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Stainless Steel -FSB- Fuel Transfer Tube in Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-5)	3.5.1-59	A
PST - Stainless Steel -FSB- Fuel Transfer Tube in Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B2-8 (TP-5)	3.5.1-59	C
PST - Stainless Steel -FSB- in Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-5)	3.5.1-59	A
PST - Stainless Steel -PAB- Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B2-8 (TP-5)	3.5.1-59	C
PST - Stainless Steel -PAB- Exposed to Raw Water	Shelter, Protection	Stainless Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	VII.H2-18 (Ap-55)	3.3.1-80	E, 512

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Stainless Steel -PAB- in Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-5)	3.5.1-59	A
PST - Stainless Steel -WPB- Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B2-8 (TP-5)	3.5.1-59	C
PST - Stainless Steel -WPB- Exposed to Raw Water	Shelter, Protection	Stainless Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	VII.H2-18 (Ap-55)	3.3.1-80	E, 512
PST - Stainless Steel -WPB- in Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B2-9 (TP-5)	3.5.1-59	A
PST - Tech Spec CEVA Seal -EFP- Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Tech Spec CEVA Seal -EFP- Exposed to Air Outdoor	Structural Pressure Barrier	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Tech Spec CEVA Seal -FSB- Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
PST - Tech Spec CEVA Seal -PAB- Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
PST - Tech Spec CEVA Seal -PAB- Exposed to Air Outdoor	Structural Pressure Barrier	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Tech Spec CEVA Seal -PCEW- Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST - Tech Spec CEVA Seal -PCEW- Exposed to Air Outdoor	Structural Pressure Barrier	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515
PST - Tech Spec Control Room Seal -CDG- Exposed to Air Indoor Uncontrolled	Control Bldg Habitability	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
PST - Tech Spec Fuel Storage Building Seal -FSB- Exposed to Air Indoor Uncontrolled	Structural Pressure Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 515
PST – Thermal Insulation Aluminum Jacketing -FSB- in Air with Borated Water Leakage	Structural Support	Aluminum	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-6 (TP-3)	3.5.1-55	A
PST – Thermal Insulation Aluminum Jacketing -PAB- in Air with Borated Water Leakage	Structural Support	Aluminum	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-6 (TP-3)	3.5.1-55	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
PST – Thermal Insulation Aluminum Jacketing -TFA- in Air with Borated Water Leakage	Structural Support	Aluminum	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-6 (TP-3)	3.5.1-55	A
PST – Thermal Insulation Aluminum Jacketing -WPB- in Air with Borated Water Leakage	Structural Support	Aluminum	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Program	III.B2-6 (TP-3)	3.5.1-55	A

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

Table 3.5.2-5

Primary Structures

Summary of Aging Management Evaluation

Standard Notes

Note	Description
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
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.
501	Not used.
502	Aging effect includes "Fretting or Lockup" due to wear.
503	Crevice and pitting will be included along with loss of material-corrosion due to a saltwater atmosphere environment.
504	Fatigue analysis exists and TLAA applies.
505	Built-up roofing is not in GALL; III.A6-12 is for elastomer-material is similar, aging effect is similar, environment is same, and AMP is Structures Monitoring.
506	Component is cementitious fire proofing/insulating material and will exhibit similar aging effects as concrete.
507	Spent Fuel Pool temperature < 60ºC (<140º F); water chemistry and temperature will be maintained by the Water Chemistry Program.

Control Building and Diesel Generator Building **(CDG)**, Containment Equipment Hatch Missile Shield **(CEHMS)**, Emergency Feedwater Pump Building Including Electrical Cable Tunnels and Penetration Area (Control Building to Containment) and Pre-Action Valve Building **(EFP)**, Fuel Storage Building **(FSB)**, Primary Auxiliary Building and the Residual Heat Removal Equipment Vault **(PAB)**, Main Steam and Feedwater Pipe Chases – East & West **(PCEW)**, Personnel Hatch Area **(PHA)**, Tank Farm (Tunnels) - Including Dikes and Foundation for Refueling Water Storage Tank and Reactor Makeup Water Storage Tank **(TFA)**, Waste Process Building **(WPB)**

508 Cracking, loss of bond, and loss of material (spalling, scaling)/corrosion of embedded steel-is not listed in GALL III.A.6 as an aging effect for concrete in raw water. Seabrook manages this effect with Structures Monitoring Program.

509 For aging management purposes, buried, below grade, soil, and ground water/ raw & treated water environments are treated the same.

510 Reduction in concrete anchor capacity is an aging effect that is addressed in LRAM-SUPT.

511 At Seabrook Station, XI.S7 "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" and XI.S5 "Masonry Wall Program" are combined under XI.S6 "Structures Monitoring Program".

512 Raw water in lined & unlined concrete sumps.

513 Seabrook Station will age manage this condition through the Fire Protection Program.

514 Seabrook Station will age manage this condition through the Structures Monitoring Program.

515 Increased hardness, shrinkage, or loss of strength of elastomer seals due to weathering is addressed by GALL only for Fire Barrier seals. Seabrook Station will manage such aging effects for non-Fire Barrier elastomer seals with the Structures Monitoring Program.

516 Seabrook Station Structures Monitoring Program will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.2-6

Supports

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
ASME Class 1 - Constant & Variable Load Spring Hangers - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Mechanical Function	ASME Section XI, Subsection IWF Program	III.B1.1-2 (T-28)	3.5.1-54	A
ASME Class 1 - Constant & Variable Load Spring Hangers – in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B1.1-14 (T-25)	3.5.1-55	A
ASME Class 1 - Lubrite® - Exposed to Air Indoor Uncontrolled	Structural Support	Lubrite®	Air Indoor Uncontrolled (External)	Loss of Mechanical Function	ASME Section XI, Subsection IWF Program	III.B1.1-5 (T-32)	3.5.1-56	A
ASME Class 1 - Pipe Supports - Concrete - Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B1.1-1 (T-29)	3.5.1-40	A
ASME Class 1 - Stainless Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B1.1-9 (TP-5)	3.5.1-59	A
ASME Class 1 - Stainless Steel - in Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	None	III.B1.1-10 (TP-4)	3.5.1-59	A

Table 3.5.2-6

Supports

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
ASME Class 1 Support - Carbon Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWF Program	III.B1.1-13 (T-24)	3.5.1-53	A
ASME Class 1 Support - Carbon Steel – in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B1.1-14 (T-25)	3.5.1-55	A
ASME Class 2/3 - Constant and Variable Load Spring Hangers - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Mechanical Function	ASME Section XI, Subsection IWF Program	III.B1.2-2 (T-28)	3.5.1-54	A
ASME Class 2/3 - Constant & Variable Load Spring Hangers – in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B1.2-11 (T-25)	3.5.1-55	A
ASME Class 2/3 - Lubrite® - Exposed to Air Indoor Uncontrolled	Structural Support	Lubrite®	Air Indoor Uncontrolled (External)	Loss of Mechanical Function	ASME Section XI, Subsection IWF Program	III.B1.2-3 (T-32)	3.5.1-56	A
ASME Class 2/3 Pipe Supports - Concrete - Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B1.2-1 (T-29)	3.5.1-40	A

Table 3.5.2-6

Supports

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
ASME Class 2/3 - Stainless Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B1.2-7 (TP-5)	3.5.1-59	A
ASME Class 2/3 - Stainless Steel - in Air with Borated Water Leakage	Structural Support	Stainless Steel	Air w/Borated Water Leakage (External)	None	Boric Acid Corrosion Program	III.B1.2-8 (TP-4)	3.5.1-55	A
ASME Class 2/3 - Stainless Steel - in Raw Water	Structural Support	Stainless Steel	Raw Water (External)	Loss of Material	ASME Section XI, Subsection IWF Program	III.B1.1-11 (TP-10)	3.5.1-49	H, 509, 514
ASME Class 2/3 - Stainless Steel - in Raw Water	Structural Support	Stainless Steel	Raw Water (External)	Loss of Material	ASME Section XI, Subsection IWF Program	III.B1.1-11 (TP-10)	3.5.1-49	A, 509
ASME Class 2/3 - Stainless Steel - in Treated Water	Structural Support	Stainless Steel	Treated Borated Water (External)	Loss of Material	Water Chemistry Program	III.A5-13 (T-14)	3.5.1-46	A
ASME Class 2/3 Support - Carbon Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	ASME Section XI, Subsection IWF Program	III.B1.2-10 (T-24)	3.5.1-53	A

Table 3.5.2-6

Supports

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
ASME Class 2/3 Support Carbon Steel - in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B1.2-11 (TP-25)	3.5.1-55	A
Boral Poison Sheet in Spent Fuel Racks - in Treated Water	Absorb Neutrons	Boral	Treated Borated Water (External)	Reduction of Neutron Absorbing Capacity and Loss of Material	Boral Monitoring Program	VII.A2-5 (A-88)	3.3.1-13	A
Emergency Diesel Generator (EDG) - Concrete - Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B4-1 (T-29)	3.5.1-40	A
Emergency Diesel Generator (EDG) - Lubrite® - Exposed to Air Indoor Uncontrolled	Structural Support	Lubrite®	Air Indoor Uncontrolled (External)	Loss of Mechanical Function	Structures Monitoring Program	III.B4-2 (TP-1)	3.5.1-52	A
Emergency Diesel Generator (EDG) Support - Carbon Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.B4-10 (T-30)	3.5.1-39	A
HVAC System Components - Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B4-1 (T-29)	3.5.1-40	A

Table 3.5.2-6

Supports

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
New Fuel Storage Racks Support - Carbon Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	VII.A1-1 (A-94)	3.3.1-86	A
New Fuel Storage Racks Support - Carbon Steel – in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B5-8 (T-25)	3.5.1-55	A
Non-ASME - Constant and Variable Load Spring Hangers - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Mechanical Function	Structures Monitoring Program	III.B1.2-2 (T-28)	3.5.1-54	H, 514
Non-ASME - Constant and Variable Load Spring Hangers – in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B1.2-11 (T-25)	3.5.1-55	A
Non-ASME Piping & Components - Concrete - Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B2-1 (T-29)	3.5.1-40	A
Non-ASME Piping & Components - Concrete - Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B2-1 (T-29)	3.5.1-40	A

Table 3.5.2-6

Supports

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Non-ASME Piping & Components - Lubrite® - Exposed to Air Indoor Uncontrolled	Structural Support	Lubrite®	Air Indoor Uncontrolled (External)	Loss of Mechanical Function	Structures Monitoring Program	III.B2-2 (TP-1)	3.5.1-52	A
Non-ASME - Stainless Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B2-8 (TP-5)	3.5.1-59	A
Non-ASME Support - Carbon Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.B2-10 (T-30)	3.5.1-39	A
Non-ASME Support - Carbon Steel - Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.B2-10 (T-30)	3.5.1-39	A
Non-ASME Support - Carbon Steel – in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B2-11 (T-25)	3.5.1-55	A
Panels - Aluminum – Exposed to Air Indoor Uncontrolled	Structural Support	Aluminum	Air Indoor Uncontrolled (External)	None	None	III.B3-2 (TP-8)	3.5.1-58	A

Table 3.5.2-6

Supports

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Panels - Aluminum – in Air with Borated Water Leakage	Structural Support	Aluminum	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B3-4 (T-3)	3.5.1-55	A
Panels - Carbon Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.B3-7 (T-30)	3.5.1-39	A
Panels - Carbon Steel - Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.B3-7 (T-30)	3.5.1-39	A
Panels - Carbon Steel - in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B3-8 (T-25)	3.5.1-55	A
Panels - Concrete - Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B3-1 (T-29)	3.5.1-40	A
Panels - Concrete - Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B3-1 (T-29)	3.5.1-40	A

Table 3.5.2-6

Supports

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Platform - Concrete - Exposed to Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B5-1 (T-29)	3.5.1-40	A
Platform - Concrete - Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Reduction in Concrete Anchor Capacity	Structures Monitoring Program	III.B5-1 (T-29)	3.5.1-40	A
Platform Supports - Carbon Steel - Exposed to Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.B5-7 (T-30)	3.5.1-39	A
Platform Supports - Carbon Steel - Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.B5-7 (T-30)	3.5.1-39	A, 503
Platform Supports - Carbon Steel – in Air with Borated Water Leakage	Structural Support	Steel	Air w/Borated Water Leakage (External)	Loss of Material	Boric Acid Corrosion Program	III.B5-8 (T-25)	3.5.1-55	A
Spent Fuel Rack Support - Stainless Steel - in Treated Water	Structural Support	Stainless Steel	Treated Borated Water (External)	Cracking	Water Chemistry Program	VII.A2-7 (A-97)	3.3.1-90	A, 507

Table 3.5.2-6

Supports

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
Thermal Insulation Aluminum Jacketing - Exposed to Air Indoor Uncontrolled	Structural Support	Aluminum	Air Indoor Uncontrolled (External)	None	None	III.B2-4 (TP-8)	3.5.1-58	A
Thermal Insulation Stainless Steel Jacketing - Exposed to Air Indoor Uncontrolled	Structural Support	Stainless Steel	Air Indoor Uncontrolled (External)	None	None	III.B2-8 (TP-4)	3.5.1-59	A

Table 3.5.2-6
Supports
Summary of Aging Management Evaluation

Standard Notes

Note	Description
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
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.
501	Not used.
502	Aging effect includes "Fretting or Lockup" due to wear.
503	Crevice and pitting will be included along with loss of material-corrosion due to a saltwater atmosphere environment.
504	Fatigue analysis exists and TLAA applies.
505	Built-up roofing is not in GALL; III.A6-12 is for elastomer-material is similar, aging effect is similar, environment is same, and AMP is Structures Monitoring.
506	Component is cementitious fire proofing/insulating material and will exhibit similar aging effects as concrete.
507	Spent Fuel Pool temperature < 60ºC (<140º F); water chemistry and temperature will be maintained by the Water Chemistry Program.
508	Cracking, loss of bond, and loss of material (spalling, scaling)/corrosion of embedded steel-is not listed in GALL III.A.6 as an aging effect for concrete in raw water. Seabrook manages this effect with Structures Monitoring Program.
509	For aging management purposes, buried, below grade, soil, and ground water/ raw & treated water environments are treated the

same.

510 Reduction in concrete anchor capacity is an aging effect that is addressed in LRAM-SUPT.

511 At Seabrook Station, XI,.S7 “RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” and XI,.S5 “Masonry Wall Program” are combined under XI,.S6 “Structures Monitoring Program”.

512 Raw water in lined & unlined concrete sumps.

513 Seabrook Station will age manage this condition through the Fire Protection Program.

514 Seabrook Station will age manage this condition through the Structures Monitoring Program.

515 Increased hardness, shrinkage, or loss of strength of elastomer seals due to weathering is addressed by GALL only for Fire Barrier seals. Seabrook Station will manage such aging effects for non-Fire Barrier elastomer seals with the Structures Monitoring Program.

516 Seabrook Station Structures Monitoring Program will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.2-7

Turbine Building

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
TUR - Aluminum - in Air Indoor Uncontrolled	Structural Support	Aluminum	Air Indoor Uncontrolled (External)	None	None	III.B3-2	3.5.1-58	A
TUR - Built-Up Roofing - Exposed to Air Outdoor	Structural Support	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III .A6-12 (TP-7)	3.5.1-44	H, 505
TUR - Carbon Steel - Exposed to Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III .A3-12 (T-11)	3.5.1-25	A, 503
TUR - Carbon Steel - in Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III .A3-12 (T-11)	3.5.1-25	A
TUR - Concrete (Sump) - Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III .A3-4 (T-05)	3.5.1-31	A, 509
TUR - Concrete (Sump) - Exposed to Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III .A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-7

Turbine Building

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
TUR - Concrete - Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III .A3-9 (T-04)	3.5.1-23	A
TUR - Concrete - Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III .A3-2 (T-03)	3.5.1-27	A
TUR - Concrete - Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III .A3-10 (T-06)	3.5.1-24	A
TUR - Concrete - Exposed to Air Outdoor	Structural Support	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III .A3-6 (T-01)	3.5.1-26	A
TUR - Concrete - in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III .A3-9 (T-04)	3.5.1-23	A
TUR - Concrete - in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III .A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-7

Turbine Building

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
TUR - Concrete - in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III .A3-10 (T-06)	3.5.1-24	A
TUR - Concrete Masonry Units - in Air Indoor Uncontrolled	Structural Support	Concrete Block	Air Indoor Uncontrolled (External)	Cracking	Structures Monitoring Program	III .A3-11 (T-12)	3.5.1-43	A
TUR - Fire Penetration Seal - in Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A
TUR - Fire Penetration Seal - in Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-1 (A-19)	3.3.1-61	E, 514
TUR - Penetration Seal - Exposed to Air Outdoor	Structural Support	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515

Table 3.5.2-7
Turbine Building
Summary of Aging Management Evaluation

Standard Notes

Note	Description
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
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.
501	Not used.
502	Aging effect includes "Fretting or Lockup" due to wear.
503	Crevice and pitting will be included along with loss of material-corrosion due to a saltwater atmosphere environment.
504	Fatigue analysis exists and TLAA applies.
505	Built-up roofing is not in GALL; III.A6-12 is for elastomer-material is similar, aging effect is similar, environment is same, and AMP is Structures Monitoring.
506	Component is cementitious fire proofing/insulating material and will exhibit similar aging effects as concrete.
507	Spent Fuel Pool temperature < 60ºC (<140º F); water chemistry and temperature will be maintained by the Water Chemistry Program.
508	Cracking, loss of bond, and loss of material (spalling, scaling)/corrosion of embedded steel-is not listed in GALL III.A.6 as an aging effect for concrete in raw water. Seabrook manages this effect with Structures Monitoring Program.
509	For aging management purposes, buried, below grade, soil, and ground water/ raw & treated water environments are treated the same.
510	Reduction in concrete anchor capacity is an aging effect that is addressed in LRAM-SUPT.

511 At Seabrook Station, XI.S7 “RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” and XI.S5 “Masonry Wall Program” are combined under XI.S6 “Structures Monitoring Program”.

512 Raw water in lined & unlined concrete sumps.

513 Seabrook Station will age manage this condition through the Fire Protection Program.

514 Seabrook Station will age manage this condition through the Structures Monitoring Program.

515 Increased hardness, shrinkage, or loss of strength of elastomer seals due to weathering is addressed by GALL only for Fire Barrier seals. Seabrook Station will manage such aging effects for non-Fire Barrier elastomer seals with the Structures Monitoring Program.

516 Seabrook Station Structures Monitoring Program will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Built-Up Roofing - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
WCS - Built-Up Roofing - SERVICE WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Roofing	Air Outdoor (External)	Separation, Environmental Degradation, Water In-Leakage	Structures Monitoring Program	III.A6-12 (TP-7)	3.5.1-44	H, 505
WCS - Carbon Steel Door - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Shelter, Protection	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
WCS - Carbon Steel Door - SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
WCS - Carbon Steel Door - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
WCS - Carbon Steel Door - SERVICE WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Carbon Steel Fire Door - SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A
WCS - Carbon Steel Fire Door - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Fire Barrier	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-3 (A-21)	3.3.1-63	A
WCS - Carbon Steel - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Structural Support	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
WCS - Carbon Steel - SERVICE WATER COOLING TOWER in Raw Water	Structural Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 511
WCS - Carbon Steel - SERVICE WATER COOLING TOWER in Raw Water	Structural Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 511
WCS - Carbon Steel - SERVICE WATER COOLING TOWER in Raw Water	Structural Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	H, 511

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Carbon Steel - SERVICE WATER COOLING TOWER in Raw Water	Structural Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 511
WCS - Carbon Steel - SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
WCS - Carbon Steel - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
WCS - Carbon Steel - SERVICE WATER PUMPHOUSE in Raw Water	Structural Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 511
WCS - Carbon Steel - SERVICE WATER PUMPHOUSE in Raw Water	Structural Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 511
WCS - Carbon Steel - SERVICE WATER PUMPHOUSE in Raw Water	Structural Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	H, 511

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Carbon Steel - SERVICE WATER PUMPHOUSE in Raw Water	Structural Support	Steel	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-11 (T-21)	3.5.1-47	E, 511
WCS - Carbon Steel - SERVICE WATER PUMPHOUSE Siding in Air Indoor Uncontrolled	Shelter, Protection	Steel	Air Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A
WCS - Carbon Steel - SERVICE WATER PUMPHOUSE Siding in Air Outdoor	Shelter, Protection	Steel	Air Outdoor (External)	Loss of Material	Structures Monitoring Program	III.A3-12 (T-11)	3.5.1-25	A, 503
WCS - Concrete - CIRCULATING WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete - CIRCULATING WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
WCS - Concrete - CIRCULATING WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Raw Water	Structural Support	Concrete	Raw Water (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete - CIRCULATING WATER PUMPHOUSE in Raw Water	Structural Support	Concrete	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 511
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
WCS – Concrete - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
WCS – Concrete - SERVICE WATER COOLING TOWER in Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
WCS – Concrete - SERVICE WATER COOLING TOWER in Raw Water	Ultimate Heat Sink	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509
WCS – Concrete - SERVICE WATER COOLING TOWER in Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS – Concrete - SERVICE WATER COOLING TOWER in Raw Water	Ultimate Heat Sink	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS – Concrete - SERVICE WATER COOLING TOWER in Raw Water	Structural Support	Concrete	Raw Water (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
WCS – Concrete - SERVICE WATER COOLING TOWER in Raw Water	Ultimate Heat Sink	Concrete	Raw Water (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
WCS – Concrete - SERVICE WATER COOLING TOWER in Raw Water	Structural Support	Concrete	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 511
WCS – Concrete - SERVICE WATER COOLING TOWER in Raw Water	Ultimate Heat Sink	Concrete	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 511
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
WCS - Concrete -SERVICE WATER COOLING TWR Including Swgr Rms in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
WCS - Concrete - SERVICE WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A
WCS - Concrete - SERVICE WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete - SERVICE WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-5 (T-07)	3.5.1-31	A
WCS - Concrete - SERVICE WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A, 509
WCS - Concrete - SERVICE WATER PUMPHOUSE Below Grade	Structural Support	Concrete	Ground Water/Soil (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Loss of Material	Fire Protection Program	VII.G-29 (A-91)	3.3.1-67	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection Program	VII.G-28 (A-90)	3.3.1-65	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Fire Barrier	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Structural Support	Concrete	Air Indoor Uncontrolled (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-9 (T-04)	3.5.1-23	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-10 (T-06)	3.5.1-24	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Outdoor	Missile Barrier	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Concrete	Air Outdoor (External)	Loss of Material, Cracking	Structures Monitoring Program	III.A3-6 (T-01)	3.5.1-26	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Raw Water	Structural Support	Concrete	Raw Water (External)	Cracking, Loss of Bond, Loss of Material (Spalling, Scaling)	Structures Monitoring Program	III.A3-4 (T-05)	3.5.1-31	A, 509

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Concrete - SERVICE WATER PUMPHOUSE in Raw Water	Structural Support	Concrete	Raw Water (External)	Expansion and Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Raw Water	Structural Support	Concrete	Raw Water (External)	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
WCS - Concrete - SERVICE WATER PUMPHOUSE in Raw Water	Structural Support	Concrete	Raw Water (External)	Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 511
WCS - Fire Penetration Seal - SERVICE WATER COOLING TWR including Swgr Rms in Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A
WCS - Fire Seal - SERVICE WATER PUMPHOUSE in Air Indoor Uncontrolled	Fire Barrier	Elastomer	Air Indoor Uncontrolled (External)	Increased Hardness, Shrinkage and Loss of Strength	Fire Protection Program	VII.G-1 (A-19)	3.3.1-61	A
WCS - Penetration Seal - SERVICE WATER COOLING TOWER Including Switchgear Rooms in Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515

Table 3.5.2-8

Water Control Structures

Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG 1801 Vol. 2 Item	Table 3.X.1 Item	Note
WCS - Penetration Seal - SERVICE WATER PUMPHOUSE in Air Outdoor	Shelter, Protection	Elastomer	Air Outdoor (External)	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring Program	VII.G-2 (A-20)	3.3.1-61	E, 515

Table 3.5.2-8
Water Control Structures
Summary of Aging Management Evaluation

Standard Notes

Note	Description
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
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.
501	Not used.
502	Aging effect includes "Fretting or Lockup" due to wear.
503	Crevice and pitting will be included along with loss of material-corrosion due to a saltwater atmosphere environment.
504	Fatigue analysis exists and TLAA applies.
505	Built-up roofing is not in GALL; III.A6-12 is for elastomer-material is similar, aging effect is similar, environment is same, and AMP is Structures Monitoring.
506	Component is cementitious fire proofing/insulating material and will exhibit similar aging effects as concrete.
507	Spent Fuel Pool temperature < 60ºC (<140º F); water chemistry and temperature will be maintained by the Water Chemistry Program.
508	Cracking, loss of bond, and loss of material (spalling, scaling)/corrosion of embedded steel-is not listed in GALL III.A.6 as an aging effect for concrete in raw water. Seabrook manages this effect with Structures Monitoring Program.
509	For aging management purposes, buried, below grade, soil, and ground water/ raw & treated water environments are treated the same.
510	Reduction in concrete anchor capacity is an aging effect that is addressed in LRAM-SUPT.
511	At Seabrook Station, XI.S7 “RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” and XI.S5 “Masonry Wall Program” are combined under XI.S6 “Structures Monitoring Program”.

512 Raw water in lined & unlined concrete sumps.

513 Seabrook Station will age manage this condition through the Fire Protection Program.

514 Seabrook Station will age manage this condition through the Structures Monitoring Program.

515 Increased hardness, shrinkage, or loss of strength of elastomer seals due to weathering is addressed by GALL only for Fire Barrier seals. Seabrook Station will manage such aging effects for non-Fire Barrier elastomer seals with the Structures Monitoring Program.

516 Seabrook Station Structures Monitoring Program will perform concrete testing and rebar inspection to determine the effects of the aggressive groundwater on the concrete. The concrete testing and the rebar inspection will represent all concrete below grade.

3.6 AGING MANAGEMENT OF ELECTRICAL AND INSTRUMENTATION AND CONTROLS

3.6.1 INTRODUCTION

This section provides the results of the aging management review for the electrical commodity groups identified in Section 2.5, Scoping and Screening Results: Electrical and Instrumentation and Control (I&C) Systems/Commodity Groups.

The electrical and instrumentation and control commodity groups requiring aging management review are listed below. The following sections identify materials, environments, aging effects requiring management and associated aging management programs (AMPs) for each electrical commodity group identified in Section 2.5.4.

- Non-EQ Electrical Cables and Connections
- Metal Enclosed Bus
- Fuse Holders (Not Part of a Larger Assembly) Metallic Clamps
- Cable Connections (Metallic Parts)
- SF_6 Insulated Bus, Connections and Insulators

3.6.2 RESULTS

The following tables summarize the results of the aging management review.

- Table 3.6-1 Summary Of Aging Management Evaluations for the Electrical / I&C Components / Commodities
- Table 3.6-2 Summary Of Aging Management Evaluations - Electrical / I&C Components / Commodities

3.6.2.1 Materials, Environments, Aging Effects Requiring Management and Aging Management Programs

3.6.2.1.1 Non-EQ Electrical Cables and Connections

Materials

The materials of construction for the Non-Environmentally Qualified (Non-EQ) electrical cables and connections are:

- Various Organic Polymers

Environments

The Non-EQ electrical cables and connections are exposed to the following environments:

- Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen
- Adverse localized environment caused by exposure to moisture and voltage

Aging Effects Requiring Management

The following aging effects associated with Non-EQ electrical cable and connections require management:

- Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure
- Localized damage and breakdown of insulation leading to electrical failure

Aging Management Programs

The following aging management programs manage the aging effects for the Non-EQ electrical cables and connections:

- Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.32)

- Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (B.2.1.33)

- Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.34)

3.6.2.1.2 Metal Enclosed Bus

Materials

The materials of construction for the Metal Enclosed Bus are:

- Aluminum
- Copper
- Elastomer
- Epoxy
- Polyester glass
- Porcelain
- Silver plated aluminum
- Silver plated copper
- Stainless Steel
- Steel

Environments

The Metal Enclosed Bus are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air-Outdoor

Aging Effects Requiring Management

The following aging effects associated with Metal Enclosed Bus require management:

- Loosening of bolted connections
- Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure.
- Moisture and debris intrusion

Aging Management Programs

The following aging management programs manage the aging effects for the Metal Enclosed Bus

- Metal Enclosed Bus (B.2.1.35)
- Structures Monitoring Program (B.2.1.31)

3.6.2.1.3 Fuse Holders (Not Part of a Larger Assembly) Metallic Clamps

Materials

The materials of construction of Fuse Holders (Not Part of a Larger Assembly) Metallic Clamps are:

- Various conductive metals including copper alloy.

Environments

The metallic clamps of Fuse Holders (Not Part of a Larger Assembly) Metallic Clamps are exposed to the following environments:

- Air Indoor Uncontrolled

Aging Effects Requiring Management

The following aging effect associated with Fuse Holders (Not Part of a Larger Assembly) Metallic Clamps requires management:

- Thermal fatigue in the form of high resistance

Aging Management Programs

The following aging management programs manage the aging effects for the Fuse Holders (Not Part of a Larger Assembly) Metallic Clamps:

- Fuse Holders (B.2.1.36)

3.6.2.1.4 Cable Connections (Metallic Parts)

Materials

The materials of construction for the Cable Connections (Metallic Parts) are:

- Various conductive metals used for electrical contacts

Environments

The Cable Connections (Metallic Parts) are exposed to the following environments:

- Air Indoor Controlled
- Air Indoor Uncontrolled
- Air Outdoor
- Air with Borated Water Leakage

Aging Effects Requiring Management

The following aging effects associated with Cable Connections (Metallic Parts) require management:

- Loosening of bolted connections
- Corrosion of connector contact surfaces

Aging Management Programs

The following aging management programs manage the aging effects for Cable Connections (Metallic Parts):

- Electrical Cable Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.37)
- Boric Acid Aging Management Program (B.2.1.4)

3.6.2.1.5 SF_6 Insulated Bus, Connections and Insulators

Materials

The materials of construction for the Sulfur Hexafluoride (SF_6) Insulated Bus, Connections and Insulators are:

- Aluminum
- Elastomer
- Epoxy
- Gas (SF_6)
- Stainless Steel
- Silver Plated Aluminum

Environments

The SF_6 Insulated Bus, Connections and Insulators are exposed to the following environments:

- Gas (SF_6)
- Air-Outdoor

Aging Effects Requiring Management

The following aging effects associated with SF_6 Insulated Bus, Connections and Insulators require management:

- Loss of pressure boundary
- Loss of insulating properties due to changes in SF_6 properties.

Aging Management Programs

The following aging management programs manage the aging effects for the SF_6 Bus:

- 345 kV SF_6 Bus (B.2.2.1)

3.6.2.2 AMR Results for Which Further Evaluation is Recommended by the GALL Report

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation by the reviewer in the License Renewal Application (LRA). For the Electrical / I&C commodities, those programs are addressed in the following subsections.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

Environmental qualification is 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 this TLAA is addressed in Section 4.4, "Environmental Qualification (EQ) of Electric Equipment," of this application.

3.6.2.2.2 Degradation of Insulator Quality due to Presence of Any Salt Deposits and Surface Contamination, and Loss of Material due to Mechanical Wear

The SF_6 switchyard connects Seabrook Station to the off site transmission grid. The SF_6 bus is included as part of the recovery path in the event of a Station Blackout event.

The design of the SF_6 switchyard does not include high voltage insulators that are commonly associated with an open air switchyard design.

Conclusion

The Seabrook Station switchyard design does not include high voltage insulators, therefore the aging mechanisms and effects are not applicable.

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 Pre-load

The SF_6 switchyard connects Seabrook Station to the off site transmission grid.

The in-scope portion of the SF_6 switchyard does not include transmission conductors and connections or switchyard bus and connections that are commonly associated with an open air switchyard design.

Conclusion

The in-scope portion of the Seabrook Station switchyard design does not include transmission conductors and connections or switchyard bus and connections, therefore the aging mechanisms and effects are not applicable.

3.6.2.2.4 Quality Assurance for Aging Management of Nonsafety-Related Components

Quality Assurance (QA) provisions applicable to License Renewal are discussed in Section B.1.3.

3.6.2.3 AMR Results Not Consistent with or Not Addressed in the GALL Report

The 345kV SF_6 switchyard connects Seabrook Station to the off site transmission grid. The SF_6 bus is included as part of the recovery path in the event of a Station Blackout event. As discussed in Section 3.6.2.2.2 and 3.6.2.2.3, the design of the SF_6 switchyard does not include high voltage insulators and transmission lines that are normally associated with an open air switchyard. The SF_6 bus is a phase isolated and independent bus in which each phase conductor is enclosed by an individual metal housing separated from adjacent conductor housings by an air space. The conductor is centered in the housing by insulators. The insulating parameters are accomplished by maintaining the space achieved by the insulators and the insulating properties of the SF_6 gas.

The critical conditions which are essential to the bus operation are maintaining the pressure boundary and the air, moisture and sulfur dioxide (SO_2) content.

The presence of moisture could lead to electrical failure and the presence of SO_2 is an indication of partial discharge in the system.

The external surface of the SF_6 bus is managed for loss of material. The pressure boundary and the quality of the SF_6 gas is managed by the 345kV SF_6 Bus Aging Management Program (B.2.2.1).

3.6.3 CONCLUSION

The electrical commodity groups that are subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B. These activities demonstrate that the aging effects associated with the electrical commodity groups will be adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.6.1

Summary of Aging Management Evaluations for the Electrical / I&C Components / Commodities

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-1	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 (See Subsection 3.6.2.2.1)	Environmental Qualification (EQ) of Electric Components is a TLAA. Further evaluation is documented in Section 4.4 and Subsection 3.6.2.2.1
3.6.1-2	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. The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program, B.2.1.32, will be used to manage reduced insulation resistance and electrical failure due to various mechanisms, in adverse localized environments, for insulated cables and connections, including connection insulation for splices, terminal blocks and fuse holders.
3.6.1-3	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 Used In Instrumentation Circuits Not Subject To 10 CFR 50.49 EQ Requirements	No	Consistent with NUREG-1801. This AMP manages the aging of the Nuclear Instrumentation cables. Radiation Monitoring cables are included in the EQ Program.The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used In Instrumentation Circuits Program, B.2.1.33, will be used to manage reduced insulation resistance and electrical failure, due to various mechanisms, in adverse localized environments, for insulated cables and connections used in nuclear instrumentation circuits.

Table 3.6.1

Summary of Aging Management Evaluations for the Electrical / I&C Components / Commodities

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-4	Conductor insulation for inaccessible medium voltage (2 kV to 35 kV) 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. The Inaccessible Medium Voltage Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Program, B.2.1.34, will be used to manage localized damage and breakdown of insulation leading to electrical failure, due to moisture intrusion and water trees, in adverse localized environments, for medium voltage cables.
3.6.1-5	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. The Boric Acid Corrosion Program, B.2.1.4, will be used to manage corrosion of connector contact surfaces for electrical connectors exposed to borated water leakage.
3.6.1-6	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	Consistent with NUREG-1801. The Fuse Holders Program, B.2.1.36, will manage, increase of resistance due to corrosion, and oxidation for fuse holders metallic clamp. Fatigue due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination are not viable aging effects. See Note 603 of Table 3.6.2
3.6.1-7	Metal enclosed bus - Bus/connections	Loosening of bolted connections due to thermal cycling and ohmic heating	Metal Enclosed Bus	No	Consistent with NUREG-1801. The Metal Enclosed Bus Program, B.2.1.35, will be used to manage the aging effect of loosening of bolted connections for the metal enclosed bus.

Table 3.6.1

Summary of Aging Management Evaluations for the Electrical / I&C Components / Commodities

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-8	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. The Metal Enclosed Bus Program, B.2.1.35, will be used to manage the aging effects of reduced insulation resistance and electrical failure for metal enclosed bus
3.6.1-9	Metal enclosed bus – Enclosure assemblies	Loss of material due to general corrosion	Structures Monitoring Program	No	Consistent with NUREG-1801. The Structures Monitoring Program, B.2.1.31, will be used to manage the aging effect of loss of material due to general corrosion for metal enclosed bus.
3.6.1-10	Metal enclosed bus – Enclosure assemblies	Hardening and loss of strength due to elastomer degradation	Structures Monitoring Program	No	Consistent with NUREG-1801. The Structures Monitoring Program, B.2.1.31, will be used to manage the aging effects of hardening and loss of strength due to elastomer degradation for metal enclosed bus.
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	A plant-specific aging management program is to be evaluated.	Yes, plant specific (See subsection 3.6.2.2.2)	The Seabrook Station design does not contain high-voltage insulators that are typically associated with an open air switchyards. (See subsection 3.6.2.2.2)

Table 3.6.1

Summary of Aging Management Evaluations for the Electrical / I&C Components / Commodities

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	A plant-specific aging management program is to be evaluated.	Yes, plant specific (See subsection 3.6.2.2.3)	The Seabrook Station design does not contain transmission conductors and connections, or switchyard bus and connections that are typically associated with an open air switchyards (See subsection 3.6.2.2.3)
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. The Electrical Cable Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Program, B.2.1.37, will be used to manage loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation of the metallic parts of cable connections. The Seabrook Station AMP is consistent with the final issue of LR ISG 2007-02.
3.6.1-14	Fuse Holders (Not Part of a Larger Assembly) Insulation material	None	None	No Aging Effect Requiring Management or Aging Management Program is required.	Consistent with NUREG-1801.

Table 3.6.2-1

Summary Of Aging Management Evaluations for the Electrical / I&C Components / Commodities

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Cable Connections (Metallic Parts)	Electrical Continuity	Various metals used for electrical contacts	Air – indoor controlled Air – indoor uncontrolled Air-outdoor	Loosening of bolted connections	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A-1 (LP-12)	3.6.1-13	A 601
Non-EQ Electrical Cables and Connections	Electrical Continuity	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	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A-2 (L-01)	3.6.1-2	A
Non-EQ Electrical Cables and Connections used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance (IR)	Electrical Continuity	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	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	VI.A-3 (L-02)	3.6.1-3	A 602

Table 3.6.2-1

Summary Of Aging Management Evaluations for the Electrical / I&C Components / Commodities

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Non-EQ inaccessible medium-voltage cables	Electrical Continuity	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by exposure to moisture and voltage	Localized damage and breakdown of insulation leading to electrical failure	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A-4 (L-03)	3.6.1-4	A
Cable Connections (Metallic Parts) (Connector contacts for electrical connectors exposed to borated water Leakage)	Electrical Continuity	Various metals used for electrical contacts	Air with borated water leakage	Corrosion of connector contact surfaces	Boric Acid Corrosion	VI.A-5 (L-04)	3.6.1-5	A
Electrical Equipment Subject to 10 CFR 50.49 EQ Requirements	Electrical Continuity	Various Polymeric and Metallic Materials	Adverse localized environment	Various degradation	Environmental Qualification (EQ) of Electric Components	VI.B-1	3.6.1-1	A
Fuse Holders (Not Part of a Larger Assembly); Insulation	Electrical Continuity	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen or > 60-year service limiting temperature	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A-6 (LP-03)	3.6.1-2	A

Table 3.6.2-1

Summary Of Aging Management Evaluations for the Electrical / I&C Components / Commodities

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Fuse Holders (Not Part of a Larger Assembly); Insulation	Electrical Continuity	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Air – indoor uncontrolled (Internal/External)	None	None	VI.A-7 (LP-02)	3.6.1-14	A
Fuse Holders (Not Part of a Larger Assembly); Metallic Clamp	Electrical Continuity	Various conductive metals including copper alloy	Air – indoor	Thermal fatigue in the form of high resistance	Fuse Holders	VI.A-8 (LP-01)	3.6.1-6	A 603
Metal Enclosed Bus Bus/connections	Electrical Continuity	Aluminum Copper Stainless steel, steel	Air – indoor Uncontrolled Air -outdoor	Loosening of bolted connections	Metal Enclosed Bus	VI.A-11 (LP-04)	3.6.1-7	A 604
Metal Enclosed Bus Enclosure assemblies	Support	Elastomers	Air – indoor Uncontrolled Air -outdoor	Hardening and loss of strength	Structures Monitoring Program	VI.A-12 (LP-10)	3.6.1-10	A
Metal Enclosed Bus Enclosure assemblies	Support	Steel / Aluminum	Air – indoor Uncontrolled Air -outdoor	Loss of material	Structures Monitoring Program	VI.A-13 (LP-06)	3.6.1-9	A
Metal Enclosed Bus Insulation/insulators	Insulation - Electrical	Porcelain	Air – indoor Uncontrolled Air -outdoor	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure	Metal Enclosed Bus	VI.A-14 (LP-05)	3.6.1-8	A

Table 3.6.2-1

Summary Of Aging Management Evaluations for the Electrical / I&C Components / Commodities

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 3.X.1 Item	Note
Metal Enclosed Bus Insulation/insulators	Insulation - Electrical	Polyester glass, Epoxy	Air – indoor Uncontrolled Air -outdoor	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure	Metal Enclosed Bus	VI.A-14 (LP-05)	3.6.1-8	F
SF_6 Insulated Bus, Connections and Insulators (Insulation/insulators)	Insulation - Electrical	SF_6 gas Epoxy	Gas (SF_6) (internal)	Loss of dielectric strength	345 KV SF_6 Bus	None	None	J
SF_6 Insulated Bus, Connections and Insulators (Enclosure Assemblies)	Pressure Boundary	Aluminum Stainless Steel	Gas (SF_6) (internal) Air-Outdoor (external)	Loss of material	345 KV SF_6 Bus	None	None	J
SF_6 Insulated Bus, Connections and Insulators (Enclosure Assemblies)	Pressure Boundary	Elastomer	Gas (SF_6) (internal) Air-Outdoor (external)	Hardening and loss of strength	345 KV SF_6 Bus	None	None	J

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

E Consistent with NUREG-1801 for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program

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. This AMP complies with the final issue LR ISG 2007-02.
602. This AMP manages the aging of the Nuclear Instrumentation cable. Radiation Monitoring cables are managed by the EQ Program.
603. Fatigue due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration and chemical contamination does not require an AMP. Increased resistance due to corrosion or oxidation does require an AMP.
604. This portion of the AMP applies to the intermediate bolted connections on the non-segregated bus only. The connections on the isolated phase bus are welded.

CHAPTER 4

TIME-LIMITED AGING ANALYSES

4.0 TIME-LIMITED AGING ANALYSES

Chapter 4 describes the Time-Limited Aging Analyses (TLAAs) for Seabrook Station Unit 1 in accordance with 10 CFR 54.3(a) and 54.21(c). Subsequent sections describe TLAAs within these common general categories:

- Reactor Vessel Neutron Embrittlement Analysis (4.2)
- Metal Fatigue Analysis of Piping And Components (4.3)
- Environmental Qualification (EQ) of Electric Components (4.4)
- Absence of TLAA for Concrete Containment Tendon Prestress (4.5)
- Containment Liner Plate Fatigue Usage and Containment Penetration Pressurization Cycles (4.6)
- Plant-Specific Time Limited Aging Analyses (4.7)

The information on each specific TLAA within these general categories is organized under three subsections:

Summary Description

A brief description of the TLAA topic and affected components will be presented.

Analysis

The current licensing basis (CLB) analysis of the TLAA including implications of the period of extended operation (PEO).

Disposition

The disposition of the TLAA for the PEO, in accordance with 10 CFR 54.21(c)(1):

- Validation - 10 CFR 54.21(c)(1)(i) - The analysis remains valid for the period of extended operation.
- Revision - 10 CFR 54.21(c)(1)(ii) - The analysis has been projected to the end of the period of extended operation, or
- Aging Management - 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.

In some instances, a discussion is provided regarding the absence of a TLAA for components at Seabrook Station. In these cases a conclusion is presented in lieu of a disposition statement.

4.1 IDENTIFICATION OF TIME-LIMITED AGING ANALYSES

4.1.1 BACKGROUND

10 CFR 54.3 and 10 CFR 54.21 address time-limited aging analyses (TLAAs) in license renewal applications. 10 CFR 54.21(c) provides the following content requirements for TLAAs:

(c) An evaluation of time-limited aging analyses.

(1) A list of time-limited aging analyses, as defined in §54.3, must be provided. The applicant shall 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 function(s) will be adequately managed for the period of extended operation.*

(2) A list must be provided of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on time-limited aging analyses as defined in §54.3. The applicant shall provide an evaluation that justifies the continuation of these exemptions for the period of extended operation.

10 CFR 54.3 defines a time-limited aging analysis as:

Time-limited aging analyses, for the purposes of this part, are those licensee calculations and analyses that:

(1) Involve systems, structures, and components within the scope of license renewal, as delineated in §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 §54.4(b); and

(6) Are contained or incorporated by reference in the CLB.

4.1.2 METHODOLOGY

The process used to identify time-limited aging analyses for Seabrook Station is consistent with the guidance provided in NEI 95-10. Site-specific analyses and evaluations that could potentially meet the six criteria of 10 CFR 54.3 were identified by performing electronic keyword searches and by manually searching current licensing basis documents, including:

- Updated Final Safety Analysis Report (UFSAR)
- Docketed licensing correspondence
- Design Basis Documents
- Analyses, calculations, evaluation reports, and capsule surveillance reports from Westinghouse
- Applicable Westinghouse Owner's Group (WOG) reports, analyses, and supporting calculations
- Site-specific analyses, calculations, and evaluations
- Technical Specifications and Technical Specification Bases Documents
- Previous Applicant's License Renewal Applications

Industry documents that list generic time-limited aging analyses were also reviewed to provide additional assurance of the completeness of the plant-specific list. These documents included Generic Aging Lessons Learned (GALL) Report, NUREG-1801, Vol. 2, Rev. 1, Standard Review Plan for License Renewal, NUREG-1800, Chapter 4, Rev. 1, NEI 95-10, Industry Guidance for Implementing the Requirements of 10 CFR 54 the License Renewal Rule, and previously submitted License Renewal Applications from other plants.

NUREG-1801 identifies numerous aging effects that require evaluation as possible TLAAs in accordance with 10 CFR 54.21(c). Each of these was reviewed in the appropriate aging management review, or in this chapter, and dispositioned as a TLAA if identified as such under the 10 CFR 54.3(a) criteria. Tables 3.1.1, 3.2.1, 3.3.1, 3.4.1, 3.5.1 and 3.6.1, as discussed in Section 3.0, Aging Management Reviews, list the TLAA line items of the NUREG-1801 Volume 1 Summary Tables, and identify the specific sections relating to the required further evaluations.

4.1.3 IDENTIFICATION OF EXEMPTIONS

Summary Description

The requirements of 10 CFR 54.21(c) stipulate that the application for a renewed operating license should include a list of unit-specific exemptions granted pursuant to 10 CFR 50.12, that are in effect, based on time-limited aging analysis, as defined in 10 CFR 54.3. Each active exemption has been reviewed to determine exemptions that are based on time-limited aging analyses.

The UFSAR, Facility Operating License, Safety Evaluation Report and associated supplements, and docketed correspondence was searched for active exemptions granted under 10 CFR 50.12 to determine exemptions that are based on time-limited aging analyses.

Analysis

The NextEra Energy Seabrook Facility Operating License identifies two exemptions granted pursuant to 10 CFR 50.12.

- NextEra Energy Seabrook, LLC, is exempt from the Section III.D.2(b)(ii) containment airlock testing requirements of Appendix J to 10 CFR 50, because of the special circumstances described in Section 6.2.6 of SER Supplement 5 and authorized by 10 CFR 50.12(a)(2)(ii) and (iii) (51 FR 37684 October 23, 1986).

- NRC Materials License No. SNM-1963, issued December 19, 1985, granted an exemption pursuant to 10 CFR 70.24 with respect to requirements for criticality alarms. NextEra Energy Seabrook, LLC, is hereby exempted from provisions of 10 CFR 70.24 insofar as this section applies to the storage and handling of new fuel assemblies in the new fuel storage vault, spent fuel pool (when dry), and shipping containers.

UFSAR Section 3.9(N) identifies an exemption from a portion of 10 CFR Part 50, "*Domestic Licensing of Production and Utilization Facilities"* Appendix A, General Design Criterion 4 "*Environmental and Dynamic Effects Design Bases".* Acceptance of this exemption is documented in NUREG-0896 Supplement 5, Appendix K. The exemption permitted Seabrook Station to eliminate the protective devices and the dynamic loading effects associated with the postulated primary loop pipe breaks for Seabrook Station, Units 1. The exemption was limited until the completion of the second refueling outage pending outcome of commission rulemaking regarding Leak-Before Break analysis.

Conclusion

No active exemptions granted pursuant to 10 CFR 50.12 and based on a time-limited aging analysis, as defined in 10 CFR 54.3, have been identified for Seabrook Station.

4.1.4 SUMMARY OF RESULTS

Table 4.1-1: Time-Limited Aging Analyses Applicable to Seabrook Station, summarizes TLAAs identified within the current licensing basis of Seabrook Station. This table provides a list of Seabrook Station TLAAs with the disposition method used for each and the section of the LRA where each is discussed.

NUREG-1800, Table 4.1-2 and NUREG-1800, Table 4.1-3, list examples of potential TLAAs, depending upon the applicant's current licensing basis (CLB). Table 4.1-2: Review of Analyses Listed in NUREG-1800 Tables 4.1-2 and 4.1-3 summarizes the results of the Seabrook Station applicability review of these potential TLAAs and the section of the LRA where each is discussed.

Table 4.1-1 Time-Limited Aging Analyses Applicable to Seabrook Station

TLAA Category	Description	Disposition Method(s)	LRA Section
1.	**Reactor Vessel Neutron Embrittlement**		4.2
	Neutron Fluence Analyses	§54.21(c)(1)(ii)	4.2.1
	Upper Shelf Energy Analyses	§54.21(c)(1)(ii)	4.2.2
	Pressurized Thermal Shock Analyses	§54.21(c)(1)(ii)	4.2.3
	Reactor Vessel Pressure-Temperature Limits, Including Low Temperature Overpressure Protection Limits	§54.21(c)(1)(iii)	4.2.4
2.	**Metal Fatigue Of Piping And Components**		4.3
	Nuclear Steam Supply System (NSSS) Pressure Vessel and Component Fatigue Analyses	§54.21(c)(1)(i)	4.3.1
	Supplementary ASME Section III, Class 1 Piping and Component Fatigue Analyses	§54.21(c)(1)(i)	4.3.2
	Absence of a TLAA for Thermal Stresses in Piping Connected to Reactor Coolant Systems: NRC Bulletin 88-08	N/A	4.3.2.1
	NRC Bulletin 88-11, Pressurizer Surge Line Thermal Stratification	§54.21(c)(1)(i)	4.3.2.2
	Reactor Vessel Internal Aging Management	§54.21(c)(1)(i)	4.3.3
	Environmentally-Assisted Fatigue Analyses	§54.21(c)(1)(ii) §54.21(c)(1)(iii)	4.3.4
	Steam Generator Tube, Loss of Material and Fatigue from Flow-Induced Vibration	§54.21(c)(1)(i)	4.3.5
	Absence of TLAAs for Fatigue Crack Growth, Fracture Mechanics Stability, or Corrosion Analyses Supporting Repair of Alloy 600 Materials	N/A	4.3.6
	Non-Class 1 Component Fatigue Analyses	§54.21(c)(1)(i)	4.3.7
3.	**Environmental Qualification of Electric Components**	§54.21(c)(1)(iii)	4.4
4.	**Absence of TLAA for Concrete Containment Tendon Prestress**	**N/A**	4.5
5.	**Containment Liner Plate Fatigue Usage and Containment Penetration Pressurization Cycles**		4.6
	Containment Liner Plate Fatigue Usage	§54.21(c)(1)(ii)	4.6.1
	Pressurization Cycles: Personnel Airlock, Equipment Hatch and Fuel Transfer Tube Assembly Absence of TLAA for Containment Penetrations	§54.21(c)(1)(i)	4.6.2

Table 4.1-1 Time-Limited Aging Analyses Applicable to Seabrook Station			
TLAA Category	**Description**	**Disposition Method(s)**	**LRA Section**
6.	**Plant-Specific Time Limited Aging Analyses**		4.7
	Absence of a TLAA for Reactor Vessel Underclad Cracking Analyses	N/A	4.7.1
	Reactor Coolant Pump Flywheel Fatigue Crack Growth Analyses	§54.21(c)(1)(i)	4.7.2
	Leak-Before Break Analyses	§54.21(c)(1)(i)	4.7.3
	High Energy Line Break (HELB) Postulation Based on Cumulative Usage Factor	§54.21(c)(1)(i)	4.7.4
	Fuel Transfer Tube Bellows Design Cycles	§54.21(c)(1)(i)	4.7.5
	Crane Load Cycle Limits	§54.21(c)(1)(i)	4.7.6
	Polar Gantry Crane	§54.21(c)(1)(i)	4.7.6.1
	Cask Handling Crane	§54.21(c)(1)(i)	4.7.6.2
	Service Level I Coatings Qualification	§54.21(c)(1)(iii)	4.7.7
	Absence of a TLAA for Reactor Coolant Pump Code: Case N-481	N/A	4.7.8
	Canopy Seal Clamp Assemblies	§54.21(c)(1)(i)	4.7.9
	Hydrogen Analyzer	§54.21(c)(1)(i)	4.7.10
	Mechanical Equipment Qualification	§54.21(c)(1)(ii)	4.7.11
	Absence of a TLAA for Metal Corrosion Allowance	N/A	4.7.12
	Absence of a TLAA for Inservice Flaw Growth Analyses that Demonstrate Structural Stability for 40 years	N/A	4.7.13
	Diesel Generator Thermal Cycle Evaluation	§54.21(c)(1)(i)	4.7.14

Table 4.1-2 Review of Analyses Listed in NUREG-1800 Tables 4.1-2 and 4.1-3

NUREG-1800 Examples	Applicability to Seabrook	LRA Section
NUREG-1800, Table 4.1-2 – Examples of Potential TLAAs		
Reactor vessel neutron embrittlement	Yes	4.2
Concrete containment tendon prestress	No	4.5
Metal Fatigue	Yes	4.3
Environmental qualification of electrical equipment	Yes	4.4
Metal corrosion allowance	No	4.7.12
Inservice flaw growth analyses that demonstrate structure stability for 40 years	No	4.7.13
Inservice local metal containment corrosion analyses	No	N/A
High-energy line break postulation based on fatigue CUF	Yes	4.7.4
NUREG-1800, Table 4.1-3 – Additional Examples of Plant-Specific TLAAs		
Intergranular separation in the heat-affected zone (HAZ) of reactor vessel low-alloy steel under austenitic SS cladding	No	4.7.1
Low-temperature overpressure protection (LTOP) analyses	Yes	4.2.4
Fatigue analyses for the main steam supply lines to the turbine-driven auxiliary feedwater pumps	Yes	4.3.7
Fatigue analyses for the reactor coolant pump flywheel	Yes	4.7.2
Fatigue analysis of polar crane	Yes	4.7.6.1
Flow-induced vibration endurance limit, for the reactor vessel internals	Yes	4.3.3
Transient cycle count assumptions for the reactor vessel internals		
Ductility reduction of fracture toughness for the reactor vessel internals		
Leak-before-break	Yes	4.7.3
Fatigue analysis for the containment liner plate	Yes	4.6.1
Concrete penetration pressurization cycles	Yes	4.6.2
Reactor vessel circumferential weld inspection relief (BWR)	N/A	N/A

4.2 REACTOR VESSEL NEUTRON EMBRITTLEMENT

Carbon and low-alloy steels exposed to high levels of high-energy neutron irradiation exposure (fluence) are susceptible to reduction of fracture toughness, an increase in material strength and decrease in ductility. Fracture toughness is temperature dependent, and is indirectly measured in foot-pounds of absorbed energy in a Charpy impact test. In most materials, toughness increases with temperature up to a maximum value called Upper Shelf Energy (USE). Neutron embrittlement is measured in terms of Charpy transition temperature shift, Charpy upper-shelf energy decrease, and yield and ultimate tensile strength increase. Neutron embrittlement varies with material but is directly dependent upon the integrated total neutron exposure for energy levels above 1 MeV. Based upon the materials and projected fluence levels, the only reactor vessel shell items expected to be susceptible to neutron embrittlement are the reactor vessel shell components in the beltline region immediately surrounding the core.

In order to reduce the potential for brittle fracture during reactor vessel operation, Pressure-Temperature (P-T) limit curves are developed that require the reactor vessel temperature to reach specified minimum limits prior to the application of significant pressure loading to assure the materials have adequate ductility to resist the loads. Since these minimum temperatures are increased as a function of predicted cumulative fluence, the reduced material toughness as a function of fluence is offset. Adequate fracture toughness is assured at or above the minimum temperatures specified by the P-T limit curves.

In order to develop P-T limit curves, a number of tests and calculations must first be performed. The initial nil-ductility reference temperature (RT_{NDT}) is the temperature at which a material transitions from brittle-to-ductile behavior, and this temperature is determined for each reactor vessel beltline material prior to neutron exposure. Samples of each material are tested again after various degrees of neutron exposure up to end-of- life (EOL) fluence levels to determine how much this transition temperature will increase during plant operation as a function of neutron irradiation. This is performed as part of the reactor vessel surveillance program, and the acceptable fluence intervals for these tests are specified by ASTM E-185 requirements. This increase or shift in the nil-ductility reference temperature (ΔRT_{NDT}) is the amount of temperature increase required for the material to continue to act in a ductile manner for a given fluence level. The P-T curves are periodically updated for an incremental fluence increase using the initial RT_{NDT} and ΔRT_{NDT} values associated with the fluence value used, along with appropriate uncertainty margins. As the actual plant exposure approaches the fluence value used in a particular set of P-T limit curves, new curves are prepared for higher fluence values, up to the EOL fluence value.

For Seabrook Station, the reactor vessel material ΔRT_{NDT} and USE values, calculated on the basis of predicted 40-year End-of-Life (EOL) neutron fluence, are determined as part of the current licensing basis, and support safety determinations. Therefore, these calculations are TLAAs. For license renewal, these must be updated to account for the fluence expected to occur during 60 years of plant operation (55 Effective Full Power Years). The governing requirements for these updated analyses are summarized below.

NRC Regulations 10 CFR 50.60 and 10 CFR 50.61 provides fracture toughness requirements and acceptance criteria applicable to the Seabrook Station reactor vessel. NRC Regulation 10 CFR 50.60, "*Acceptance Criteria For Fracture Prevention Measures For Light Water Nuclear Power Reactors For Normal Operation,*" requires that all light water nuclear power reactors meet the requirements of 10 CFR 50, Appendix G, "*Fracture Toughness Requirements,*" and 10 CFR 50, Appendix H, "*Reactor Vessel Material Surveillance Program Requirements.*" Appendix G specifies fracture toughness requirements for the reactor coolant pressure boundary to provide margins of safety against fracture during any condition of normal plant operation, including anticipated operational occurrences and system hydrostatic tests. The Seabrook Station Reactor Vessel Integrity Surveillance Program, B.2.1.19 is required to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region of light water nuclear power reactors resulting from exposure of these materials to neutron irradiation and the thermal environment. Materials and fluence data obtained from this program are used in these fracture toughness analyses.

NRC Regulation 10 CFR 50.61, "*Fracture toughness requirements for protection against pressurized thermal shock events*," provides requirements for computing the reference temperature, RT_{PTS}, for the (EOL) fluence for each of the reactor vessel beltline materials, which is a measure of the fracture toughness after exposure to EOL fluence. It also provides a Pressurized Thermal Shock (PTS) screening criterion for each type of beltline material, which limits how high the minimum reference temperature can be raised. The RT_{PTS} screening criteria serve as limits on the degree of ΔRT_{NDT} that can be applied to account for neutron embrittlement. The RT_{PTS} values are a function of material composition and neutron fluence, and they increase as cumulative fluence increases, possibly approaching the screening criterion if the material is highly susceptible to neutron embrittlement. If the RT_{PTS} value is projected to exceed the screening criterion using the EOL fluence, licensees are required to implement flux reduction programs to prevent this from occurring.

4.2.1 NEUTRON FLUENCE ANALYSES

Summary Description

The current license period reactor vessel embrittlement analyses that evaluate reduction of fracture toughness of the Seabrook Station reactor vessel beltline materials are based on predicted 40-year EOL fluence values. The fluence analysis and the neutron embrittlement analyses that are based upon the fluence analysis are TLAAs as defined by 10 CFR 54.21(c) that must be evaluated for the increased neutron fluence associated with 60 years of operation. These TLAAs include the analyses for fracture toughness, or upper shelf energy, Pressurized Thermal Shock limits, RT_{NDT} (nil-ductility transition temperature), Adjusted Reference Temperatures (ART), Low-Temperature Overpressure Protection limits, and Reactor Vessel Pressure-Temperature limit curves. The neutron fluence TLAA is evaluated in this subsection, and the others are evaluated in subsections 4.2.2, 4.2.3, and 4.2.4.

Analysis

Estimation of EFPY for Seabrook Station based on 60-years of Plant Life

End-of-Life fluence is based on a predicted value of EFPY over the life of the plant. Seabrook Station began commercial operation on August 19, 1990. As of October 30, 2009, Seabrook Station has been operated for approximately 17 EFPY. If Seabrook Station is operated at the maximum licensed power level at a 100% capacity factor between outages until the end of period of extended operation on March 15, 2050, Seabrook Station will reach approximately 55 EFPY. This capacity factor is based on assumed outage durations of twenty (20) days during refueling outages and 100 percent power levels at all times other than during these outages.

60-Year Neutron Fluence Projections

For license renewal, Seabrook Station updated fluence projections based upon 55 EFPY as input, to the neutron embrittlement analyses prepared for 60 years of operation.

The reactor vessel beltline neutron fluence values for 60 years of operation were calculated for the Seabrook Station reactor pressure vessel beltline material. The analysis methods used to calculate the predicted 60-year Seabrook Station vessel fluence values satisfy the requirements set forth in Regulatory Guide 1.190, "*Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence*". In compliance with these guidelines, comparisons to surveillance capsule flux wire and dosimeter measurements were performed to determine the accuracy of the RPV fluence model. An uncertainty analysis was also performed to determine if a statistical bias exists in the model. It was determined that the Seabrook Station fluence model does not have a statistical bias and that the best-estimate fluence presented is suitable for use in evaluating the effects of embrittlement on RPV material as specified in (CFR) 10 CFR 50, Appendix G, *"Fracture Toughness Requirements"* and NRC Regulatory Guide 1.99, *"Radiation Embrittlement of Reactor Vessel Materials"*.

The fluence values were calculated using the RAMA Fluence Methodology (RAMA). The RAMA Fluence Methodology was developed for the Electric Power Research Institute, Inc. (EPRI) for the purpose of calculating fast neutron fluence in reactor pressure vessels and vessel internal components. As prescribed in NRC Regulatory Guide 1.190, RAMA has been benchmarked against industry standard benchmarks for both pressurized water reactor (PWR) and boiling water reactor designs. In addition, RAMA has been compared with several plant-specific dosimetry measurements and reported fluence from several commercial operating reactors. The results of the benchmarks and comparisons to measurements show that RAMA accurately predicts specimen activities, RPV fluence, and vessel component fluence in all light water reactor types. Under funding from EPRI and the Boiling Water Reactor Vessel and Internals Project, the RAMA methodology has been reviewed by the NRC and subsequently given generic approval for determining fast neutron fluence in boiling water reactor pressure vessels and vessel internal components that include the core shroud and top guide. This prior work has been extended in the Seabrook Station analysis to additional PWR benchmarks and plant-specific dosimetry comparisons, further validating the use of RAMA for all light water reactor designs.

In accordance with 10 CFR 50, Appendix H, *"Reactor Vessel Material Surveillance Program Requirements,"* any materials exceeding neutron fluence exposure greater than 1.0×10^{17} n/cm^2 (E > 1.0 MeV) must be evaluated for changes in fracture toughness due to neutron embrittlement. Reactor pressure vessel materials that were not originally considered to be part of the vessel beltline, because neutron radiation exposure was less than 1.0×10^{17} n/cm^2 $^($E > 1.0 MeV), were evaluated to determine their cumulative neutron radiation exposure at 55 EFPY. Fluence calculations were performed for the Seabrook Station reactor pressure vessel upper shell plates and welds to determine if they would exceed a neutron radiation exposure of 1.0×10^{17} n/cm^2 (E > 1.0 MeV) at 55 EFPY. The materials that exceed this threshold were included as the extended beltline materials. Table 4.2.1-1 summarizes the results of the fluence projections to 55 EFPY for Seabrook Station. Refer to Table 4.2.3-1 for the Heat Numbers associated with the Seabrook Station vessel materials. It should be noted that the intermediate/upper shell circumferential weld, the upper shell plates, and axial welds are part of the extended beltline. The nozzles and the nozzle welds are projected to be below $1x10^{17}$ n/cm^2 (E > 1 MeV) at 55 EFPY and will not become part of the extended beltline.

Table 4.2.1-1 55 EFPY Surface Fluence Projections for Beltline and Extended Beltline Materials For Seabrook Station	
Reactor Vessel Location	**Seabrook Station 55 EFPY Fluence (n/cm^2, E > 1.0 MeV)**
Lower Shell #1 (R1808-2)	3.59E+19
Lower Shell #2 (R1808-1)	3.59E+19
Lower Shell #3 (R1808-3)	3.59E+19
Intermediate Shell #1 (R1806-2)	3.63E+19
Intermediate Shell #2 (R1806-1)	3.63E+19
Intermediate Shell #3 (R1806-3)	3.63E+19
Upper Shell #1 (R1807-1)(1)	8.92E+17
Upper Shell #2 (R1807-2)(1)	8.92E+17
Upper Shell #3 (R1807-3)(1)	8.92E+17
Int./Lower Shell Circ. Weld (101-171)	3.59E+19
Int./Upper Shell Circ. Weld (103-121)(1)	8.22E+17
Upper Shell Axial Weld #1 (42°)(1)	8.88E+17
Upper Shell Axial Weld #2 (162°)(1)	6.09E+17
Upper Shell Axial Weld #3 (282°)(1)	5.24E+17
Intermediate Shell Axial Weld #1 (0°)	2.06E+19
Intermediate Shell Axial Weld #2 (120°)	2.40E+19
Intermediate Shell Axial Weld #3 (240°)	2.40E+19
Lower Shell Axial Weld #1 (90°)	2.05E+19
Lower Shell Axial Weld #2 (210°)	3.46E+19
Lower Shell Axial Weld #3 (330°)	3.46E+19

(1) Extended Beltline Region

Disposition

Revision, 10 CFR 54.21(c)(1)(ii) – The fluence analyses have been projected to the end of the period of extended operation. The materials to be included in the extended beltline requiring additional evaluation have been identified.

4.2.2 UPPER SHELF ENERGY ANALYSES

Summary Description

The current Charpy Upper Shelf Energy (USE) analyses were prepared for each reactor vessel beltline material for Seabrook Station based upon projected neutron fluence values for 40 years of service. These are TLAAs requiring evaluation using the projected 60-year fluence values.

Analysis

Title 10 CFR Part 50 Appendix G "*Fracture Toughness Requirements*" contains screening criteria that establish limits on how far the USE value for a reactor pressure vessel material may be allowed to decrease due to neutron irradiation exposure. The regulation requires the initial USE value to be greater than 75 ft-lbs in the non-irradiated condition and that the value is greater than 50 ft-lbs in the fully irradiated conditions as determined by Charpy V-notch testing on pulled capsules throughout the licensed life of the plant.

Per Regulatory Guide 1.99, Revision 2, the Charpy USE should be assumed to decrease as a function of fluence, according to Figure 2 of the Regulatory Guide, when surveillance data is not used (Position 1.2 of the Regulatory Guide). If surveillance data is used, the decrease in USE may be obtained by plotting the reduced plant surveillance data on Figure 2 of the Regulatory Guide and fitting the data with a line drawn parallel to the existing lines as the upper bound of all of the data (Position 2.2 of the Regulatory Guide). Charpy USE for the beltline forgings and welds and for the extended beltline materials was evaluated without the use of surveillance data which was determined to be conservative.

Predictions of the Charpy USE for EOL (55 EFPY) are summarized in Table 4.2.2-1 for Seabrook Station, using the corresponding 1/4T fluence projection, the copper content of the beltline materials and using Figure 2 in Regulatory Guide 1.99.

The USE values for the beltline and extended beltline materials are projected to remain above the 50 ft-lbs requirement through the period of extended operation for Seabrook Station as indicated in Table 4.2.2-1.

Table 4.2.2-1 Predicted USE Values at 55 EFPY for Seabrook Station Vessel Beltline Materials

RPV Material	Cu (%)	1/4T Fluence (E^{19} n/cm^2)	Initial USE (ft-lb)	USE Decrease (%)	USE (ft-lb)
Lower Shell #1 (R1808-2)	0.06	2.14	77	22.7	59.5
Lower Shell #2 (R1808-1)	0.06	2.14	78	22.7	60.3
Lower Shell #3 (R1808-3)	0.07	2.14	78	22.7	60.3
Intermediate Shell #1 (R1806-2)	0.06	2.16	102	22.8	78.8
Intermediate Shell #2 (R1806-1)	0.045	2.16	82	22.8	63.3
Intermediate Shell #3 (R1806-3)	0.075	2.16	115	22.8	88.8
Upper Shell #1 (R1807-1)	0.08	0.0468	66	9.2	59.9
Upper Shell #2 (R1807-2)	0.09	0.0468	66.5	9.2	60.4
Upper Shell #3 (R1807-3)	0.06	0.0468	107	9.2	97.2
Int./Lower Shell Circumferential Weld (101-171)	0.047	2.14	160	22.7	123.7
Int./Upper Shell Circumferential Weld (103-121)	0.045	0.0489	147	9.3	133.3
Upper Shell Axial Weld #1 (42°)	0.05	0.0529	>97.7	9.5	88.4
Upper Shell Axial Weld #2 (162°)	0.05	0.0363	>97.7	8.7	89.2
Upper Shell Axial Weld #3 (282°)	0.05	0.0312	>97.7	8.3	89.5
Intermediate Shell Axial Weld #1 (0°)	0.047	1.23	160	19.9	128.2
Intermediate Shell Axial Weld #2 (120°)	0.047	1.43	160	20.6	127
Intermediate Shell Axial Weld #3 (240°)	0.047	1.43	160	20.6	127
Lower Shell Axial Weld #1 (90°)	0.047	1.22	160	19.9	128.2
Lower Shell Axial Weld #2 (210°)	0.047	2.06	160	22.5	124
Lower Shell Axial Weld #3 (330°)	0.047	2.06	160	22.5	124

Disposition

Revision, 10 CFR 54.21(c)(1)(ii) – The USE analyses have been projected to the end of the period of extended operation and the resulting USE values for all of the vessel beltline materials have each been demonstrated to exceed the minimum acceptance limit of 50 ft-lbs.

4.2.3 PRESSURIZED THERMAL SHOCK ANALYSES

Summary Description

Title 10 CFR Part 50.61(b)(1) provides rules for the protection of PWRs against pressurized thermal shock (PTS). Licensees are required to assess the projected values of nil-ductility reference temperature whenever a significant change occurs in the projected values of RT_{PTS}, or upon request for a change in the expiration date for the facility operating license. The current RT_{PTS} analyses, evaluated for 32 EFPY fluence values predicted for 40 years of operation, are TLAAs requiring evaluation for 60 years.

Analysis

Reactor vessel beltline fluence is one of the factors used in determining the margin of acceptability of the reactor vessel to PTS as a result of neutron embrittlement. The margin is the difference between the maximum nil-ductility reference temperature in the limiting beltline material and the screening criteria established in accordance with 10 CFR 50.61(b)(2). The screening criteria for the limiting reactor vessel materials are 270°F for beltline plates, forgings, and axial weld materials, and 300°F for beltline circumferential weld materials.

In a letter submittal to NRC dated January 18, 1999, a revision to the limiting Seabrook Station reactor vessel beltline material was documented. That submittal identified the limiting material to be plate R1808-1 having a calculated RT_{PTS} @ EOL of 120°F. This RT_{PTS} value corresponds to fluence at the reactor vessel inside diameter of 2.37×10^{19} n/cm^2. The results of the new RT_{PTS} analyses, evaluated for 55 EFPY (or 60 years of operation), are presented in Table 4.2.3-1. The limiting RT_{PTS} value for the Seabrook Station axially-oriented welds and plates is 123.3°F, which corresponds to the Lower Shell #2 plate (R1808-1) with a projected fluence at 55 EFPY of 3.59×10^{19} n/cm^2. The limiting RT_{PTS} value for the Seabrook Station circumferentially-oriented welds at 55 EFPY is 8°F, which corresponds to the Intermediate-to-Lower Shell Circumferential Weld Seam (101-171). All of the Seabrook Station reactor vessel materials that have a surface fluence value exceeding 1.0×10^{17} n/cm^2 (E > 1.0 MeV) at 55 EFPY have been demonstrated to have an RT_{PTS} value less than the applicable screening criterion, which is 270°F for plates, forgings, and axially-oriented welds (longitudinal welds), and is 300°F for circumferentially-oriented welds. Therefore, the RT_{PTS} analyses have been satisfactorily projected for 60 years of operation.

Table 4.2.3-1 Calculation of RT_{PTS} Values for 55 EFPY at the Clad/Base Metal Interface for Seabrook Station

Reactor Vessel Beltline Region Location	Heat	Cu (%)	Ni (%)	Chem Factor (°F)	Surface Fluence (E^{19} n/cm^2)	ΔRT_{PTS} (°F)	$RT_{NDT(U)}$ (°F)	Margin (°F)	RT_{PTS} (°F)	RT_{PTS} (°F) Acceptance Criteria
Lower Shell #1 (R1808-2)	D1081-2	0.06	0.58	37.0[1]	3.59	49.3	10	34.0	93.3	270
Lower Shell #2 (R1808-1)	D1081-3	0.06	0.58	37.0[1]	3.59	49.3	40	34.0	123.3	270
Lower Shell #3 (R1808-3)	D1136-2	0.07	0.59	45.0[2]	3.59	60.0	40	17.0	117.0	270
Intermediate Shell #1 (R1806-2)	A2749-2	0.06	0.64	37.0[1]	3.63	49.4	0	34.0	83.4	270
Intermediate Shell #2 (R1806-1)	C4036-2	0.045	0.61	28.5[1]	3.63	38.0	40	34.0	112.0	270
Intermediate Shell #3 (R1806-3)	C4197-1	0.075	0.63	47.5[1]	3.63	63.4	10	34.0	107.4	270
Upper Shell #1 (R1807-1)	C4049-1	0.08	0.60	51.0[1]	0.0892	20.1	30	20.1	70.2	270
Upper Shell #2 (R1807-2)	C4049-2	0.09	0.61	58.0[1]	0.0892	22.9	30	22.9	75.7	270
Upper Shell #3 (R1807-3)	C4235-2	0.06	0.67	37.0[1]	0.0892	14.6	10	14.6	39.2	270
Int./Lower Shell Circumferential Weld (101-171)	4P6052	0.047	0.049	30.0[2]	3.59	40.0	-60	28.0	8.0	300
Int./Upper Shell Circumferential Weld (103-121)	90128	0.045	0.06	31.3[1]	0.0822	11.9	-56	36.0	-8.1	300
Upper Shell Axial Weld #1 (42°)	86998	0.05	0.11	38.7[1]	0.0888	15.2	-10	15.2	20.5	270
Upper Shell Axial Weld #2 (162°)	86998	0.05	0.11	38.7[1]	0.0609	12.6	-10	12.6	15.2	270
Upper Shell Axial Weld #3 (282°)	86998	0.05	0.11	38.7[1]	0.0524	11.6	-10	11.6	13.2	270
Intermediate Shell Axial Weld #1 (0°)	4P6052	0.047	0.049	30.0[2]	2.06	35.9	-60	28.0	3.9	270
Intermediate Shell Axial Weld #2 (120°)	4P6052	0.047	0.049	30.0[2]	2.40	37.1	-60	28.0	5.1	270
Intermediate Shell Axial Weld #3 (240°)	4P6052	0.047	0.049	30.0[2]	2.40	37.1	-60	28.0	5.1	270
Lower Shell Axial Weld #1 (90°)	4P6052	0.047	0.049	30.0[2]	2.05	35.9	-60	28.0	3.9	270
Lower Shell Axial Weld #2 (210°)	4P6052	0.047	0.049	30.0[2]	3.46	39.7	-60	28.0	7.7	270
Lower Shell Axial Weld #3 (330°)	4P6052	0.047	0.049	30.0[2]	3.46	39.7	-60	28.0	7.7	270

Notes:
1. Table (Position 1.1)
2. Surveillance Non-Ratio (Position 2.1)

Disposition

Revision, 10 CFR 54.21(c)(1)(ii) – The RT_{PTS} analyses have been projected to the end of the period of extended operation and are shown to be within the maximum allowable PTS screening criteria limits.

4.2.4 REACTOR VESSEL PRESSURE–TEMPERATURE LIMITS, INCLUDING LOW TEMPERATURE OVERPRESSURE PROTECTION LIMITS

Summary Description

Title 10 Part 50, Appendix G, "*Fracutre Toughness Requirements*" requires that the reactor pressure vessel be maintained within established pressure-temperature (P-T) limits, including heatup and cooldown operations. These limits specify the maximum allowable pressure as a function of reactor coolant temperature. As the reactor pressure vessel is exposed to increased neutron irradiation, its fracture toughness is reduced. The P-T limits must account for the anticipated reactor vessel fluence.

The calculations associated with the operating P-T limit curves involve time-limited assumptions defined by the current operating term, for example, 40 years, and they must satisfy the criteria of 10 CFR 54.3(a) for license renewal. For example, the P-T limit curves are based upon fluence values associated with 40 years of operation. Therefore, P-T limit curves are TLAAs requiring evaluation for 60 years of operation.

Analysis

The provisions of 10 CFR 50, Appendix G, require Seabrook to operate within the currently licensed P-T limit curves. These curves are required to be maintained and updated as necessary to maintain plant operation consistent with 10 CFR 50. The Reactor Vessel Integrity Surveillance Program maintains the P-T limit curves for the period of extended operation. Prior to the period of extended operation, updated P-T limit calculations will be prepared using fluence values valid for the Seabrook Station reactor vessel beltline region materials, inlet and outlet nozzles, and closure head flange locations for normal heatup, normal cooldown, and in-service leak and hydrostatic test conditions. The current heatup and cooldown limit curves are valid for 20 EFPY. In determining the allowable operating pressure-temperature limits, the minimum bolt-up temperatures, minimum temperature of core criticality, pressure test limits and low-temperature overpressure protection (LTOP) system limits are determined. These P-T limits are expressed in the form of a set of curves of allowable pressure versus temperature (P-T limit curves). These curves are updated on a periodic basis to account for increasing vessel fluence.

Heatup and cooldown P-T limit curves for 55 EFPY will be prepared using the most limiting value of RT_{NDT} (reference nil ductility transition temperature) corresponding to the limiting material in the beltline region of the reactor vessel. This is determined by using the unirradiated reactor vessel material fracture toughness properties adjusted to account for the estimated irradiation-induced shift (ΔRT_{NDT}).

RT_{NDT} increases as the material is exposed to fast-neutron flux. Therefore, to find the most limiting RT_{NDT} at any time period in the reactor's life, ΔRT_{NDT} due to the radiation exposure associated with that time period must be added to the original unirradiated RT_{NDT}. Using the Adjusted Reference Temperature (ART) values, pressure-temperature limit curves are determined in accordance with the requirements of 10 CFR Part 50, Appendix G, as augmented by Appendix G to Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code.

The 1/4 and 3/4 thickness (1/4T and 3/4T) fluences and material properties were used to determine the limiting material and calculate its pressure-temperature limits at 55 EFPY, which is bounding for the end of the period of extended operation. The limiting materials were determined from the values of ART at the 1/4T and 3/4T locations and are summarized in Table 4.2.4-1 for Seabrook Station.

Table 4.2.4-1 Summary of the Limiting ART Values to be used in Generation of the Seabrook Station Reactor Vessel Heatup and Cooldown Curves through 55 EFPY

EFPY	1/4T Limiting ART	3/4T Limiting ART
	Lower Shell Plate R1808-1	Lower Shell Plate R1808-1
55	118.6 °F	108.1 °F

Seabrook Station P-T limit curves for normal heatup and cooldown of the primary reactor coolant system at 20 EFPY were developed utilizing the 1995 Edition through the 1996 Addenda of the ASME Code Section XI, Appendix G methodology and Code Case N-641. Code Case N-641 provides alternative procedures for calculating the allowable pressure-temperature relationships and LTOP effective temperatures. Code Case N-641 divided Article G-2215 of the 1998 through the 2000 Summer Addenda Edition of Section XI, Appendix G into Articles G-2215.1 and G-2215.2 for allowable pressures and the LTOP System, respectively. Section 2215.1 of Code Case N-641 replaced all K_{IA} designations with K_{IC}, thus removing the option to use the more restrictive K_{IA} reference toughness. Article G-2215.2 provided the methodology to determine the LTOP system effective temperature.

The LTOP system provides Reactor Coolant System (RCS) pressure relief capability when system temperature is below 290°F. Two (2) pressurizer power operated relief valves (PORVs) provide the automatic relief capability during the design basis transients and automatically prevent RCS pressure from exceeding the P-T limits of 10 CFR 50, Appendix G. Using the NRC-approved methodology provided in WCAP-14040-A, Rev. 2, "*Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves*", the analysis determines the LTOP system setpoints for Seabrook Station. At the lowest RCS temperature of 60ºF (bolt-up temperature), the corresponding Appendix G limit is 621 psig. The overpressure protection system operates below a temperature of 290°F and it relies on a combination of residual heat removal (RHR) system relief valves and programmable PORVs to prevent the system from reaching a high pressure at low temperatures under the most severe design transients including mass injection and heat injection. Included in these setpoints are margins to accommodate overshoot and instrument uncertainty. The LTOP system pressure versus temperature settings are shown in Table 4.2.4-2.

Table 4.2.4-2 LTOP System Setpoints for Seabrook Station

Setpoint		Comments
Temperature (°F)	Pressure (psig)	
71	561	Overpressure protection in this range provided by the RHR relief valve
100	561	
122	561	
141	561	
161	561	
187	561	
202	950	
209	1035	Overpressure protection in this range provided by programmable PORVs
215	1108	
228	1265	
237	1446	
249	1723	
256	1897	
258	1966	
269	2345	
283	2500	
290	2500	

Disposition

Aging Management, 10 CFR 54.21(c)(1)(iii) – The provisions of 10 CFR 50, Appendix G, require Seabrook to operate within the currently licensed P-T limit curves. These curves are required to be maintained and updated as necessary to maintain plant operation consistent with 10 CFR 50. The Reactor Vessel Integrity Surveillance Program maintains the P-T limit curves for the period of extended operation. Therefore, the P-T limit curves TLAA has been dispositioned in accordance with 10 CFR 54.21(c)(1)(iii). Prior to the period of extended operation, updated P-T limit calculations will be prepared for the Seabrook Station reactor vessel beltline region materials, inlet and outlet nozzles, and closure head flange locations for normal heatup, normal cooldown, and in-service leak and hydrostatic test conditions. The Reactor Vessel Integrity Surveillance Program, B.2.1.19 monitors reactor vessel embrittlement. This program provides data to update the P-T limits and, therefore, permits Seabrook Station to manage the P-T limits going forward in accordance with 10 CFR 54(c)(1)(iii). Seabrook Station will submit updates to the P-T curves and LTOP limits to the NRC at the appropriate time to comply with 10 CFR 50 Appendix G.

4.3 METAL FATIGUE ANALYSIS OF PIPING AND COMPONENTS

Metal fatigue was evaluated in the design process for Seabrook Station pressure boundary components, including the reactor vessel, reactor coolant pumps, steam generators, pressurizer, piping, valves, and components of primary, secondary, auxiliary, steam, and other systems. The current design analyses for these components have been determined to be Time-Limited Aging Analyses (TLAAs) requiring evaluation for the period of extended operation. Fatigue TLAAs for Seabrook Station pressure boundary components are characterized by determining the applicable design code and design specifications that specify the fatigue design requirements. These design codes are listed in Table 4.3.1-1. NUREG-1801 provides a listing of components that are likely to have TLAAs in place that require evaluation for License Renewal. Each of these has been reviewed and the applicable TLAAs are evaluated in the following sections, as appropriate.

This section is divided into seven subsections that each addresses a specific grouping of components that were analyzed in accordance with the same design requirements.

These Sections are as follows:

- Nuclear Steam Supply System (NSSS) Pressure Vessel And Component Fatigue Analyses (4.3.1)
- Supplementary ASME Section III, Class 1 Piping And Component Fatigue Analyses (4.3.2)
- Reactor Vessel Internals Aging Management (4.3.3)
- Environmentally-Assisted Fatigue Analyses (4.3.4)
- Steam Generator Tube, Loss Of Material And Fatigue Usage From Flow-Induced Vibration (4.3.5)
- Absence Of TLAAs For Fatigue Crack Growth, Fracture Mechanics Stability, Or Corrosion Analyses Supporting Repair Of Alloy 600 Materials (4.3.6)
- Non-Class 1 Component Fatigue Analyses (4.3.7)

The evaluations referenced in these sections fall into the following categories:

- Explicit fatigue analyses for NSSS pressure vessels and components prepared in accordance with ASME Section III, Class A or Class 1 rules developed as part of the original design.

- Supplemental explicit fatigue analyses for piping and components that were prepared in accordance with ASME Section III rules to evaluate transients that were identified after the original design analyses were completed, such as pressurizer surge line thermal stratification, and reactor vessel internal component fatigue analyses.

- New fatigue analyses were prepared for license renewal to evaluate the effects of the reactor water environment on the sample of high-fatigue locations applicable to newer vintage Westinghouse Plants, as identified in Section 5.5 of NUREG/CR-6260. The environmental fatigue methodology and results of these analyses are presented in Section 4.3.4. New explicit analyses were prepared in accordance with ASME Section III, Class 1 rules for each of these components. For these locations environmental fatigue correction factors were computed and applied to the Cumulative Usage Factor (CUF) values developed in the Class 1 fatigue analyses.

4.3.1 NUCLEAR STEAM SUPPLY SYSTEM (NSSS) PRESSURE VESSEL AND COMPONENT FATIGUE ANALYSES

Summary Description

Nuclear Steam Supply System (NSSS) pressure vessels and primary components for Seabrook Station were designed in accordance with ASME Section III, Class 1 requirements and are required to have explicit analyses of cumulative fatigue usage. Table 4.3.1-1 identifies the applicable design codes for these components.

Table 4.3.1-1
Original Design Codes for NSSS Components at Seabrook Station

Component	Codes	Edition/Addendum
Reactor Vessel	ASME Section III, Class 1	1971 with Addenda through Summer 1972
Reactor Vessel Closure Head	ASME Section III, Class 1	1971 with Addenda through Summer 1972
Pressurizer	ASME Section III, Class 1	1971 with Addenda through Summer 1972
Steam Generators	ASME Section III, Class 1	1971 with Addenda through Summer 1972
Reactor Coolant Pump Casings	ASME Section III, Class 1	1971 with Addenda through Summer 1972

ASME Section III, Class 1 fatigue analyses determine the CUF value that results from the component being exposed to the list of postulated transients during the expected life of the component (Table 4.3.1-2). This analysis is performed using the appropriate S-N (Stress amplitude / Number of cycles) fatigue curve from ASME Section III for the component material type. The curve shows the number of cycles the component can withstand without cracking for given amplitude of applied alternating stress. The resulting CUF of less than 1.0 indicates the cumulative effects from the postulated transients will not result in the initiation of fatigue cracking.

These ASME Section III, Class 1 fatigue analyses are based upon explicit numbers and amplitudes of thermal and pressure transients described in the design specifications. The intent of the design basis transient definitions is to bound not just specific operations but a wide range of possible events with varying ranges of severity in temperature, pressure, and flow. The most limiting numbers of transients used in these NSSS component analyses are shown in Table 4.3.1-2, and are considered to be design limits.

Table 4.3.1-2
Summary of Reactor Coolant System Design Transients

Transient Description	Limiting Design Basis Number of Occurrences for 40 Year Operating Period
Normal Condition Transients:	
Plant Heatup @ ≤ 100 °F/hr	200
Plant Cooldown @ ≤ 100 °F/hr	200
Unit Loading @ 5% full power/min	13,200 (1)
Unit Unloading @ 5% full power/min	13,200 (1)
Step Load Increase of 10% of full power	2,000
Step Load Decrease of 10% of full power	2,000
Large step load decrease with steam dump	200
Steady state fluctuations	Initial – 1.5 x 10^5 Random – 3.0 x 10^5
Feedwater Cycling at Hot Shutdown	2,000
Loop out of service Normal loop shutdown Normal loop startup	 80 70
Feedwater Heaters out of service One heater out of service One bank of heaters out of service	 120 120
Unit loading between 0% to 15% of full power	500 (2)
Unit unloading between 0% to 15% of full power	500 (2)
Boron concentration equalization	26,400
Refueling	80
Reduced temperature return to power	2,000
Reactor Coolant Pumps startup/shutdown	3,000 (3)
Upset Transients:	
Loss of load without immediate turbine trip	80
Loss of all offsite power (blackout with natural circulation in the RCS)	40
Partial loss of flow (loss of one pump)	80

Table 4.3.1-2 Summary of Reactor Coolant System Design Transients	
Transient Description	**Limiting Design Basis Number of Occurrences for 40 Year Operating Period**
Reactor trip from full power:	
Without cooldown	230
With cooldown, without safety injection	160
With cooldown and safety injection	10
Inadvertent reactor coolant depressurization	20
Inadvertent startup of inactive loop	10
Control rod drop	80
Inadvertent ECCS actuation	60
Operating Basis Earthquake (5 earthquakes of 10 cycles each)	50
Excessive feedwater flow	30
RCS Cold Overpressurization	10
Emergency Transients:	
Small LOCA	5
Small steam break	5
Complete loss of flow	5
Faulted Transients:	
Main reactor coolant pipe break (LOCA)	1
Large steam line break	1
Feedwater line break	1
Reactor Coolant Pump locked rotor	1
Control rod ejection	1
Steam Generator tube rupture	Included under Reactor Trip with cooldown and safety injection
Safe Shutdown Earthquake	1
Test Transients:	
Primary side hydrostatic test	10
Secondary side hydrostatic test	10
Turbine roll test	20
Primary side leak test	200
Secondary side leak test	80
Tube leak test	800

1. For the design transient of Unit Loading and Unit Unloading @ 5% full power/min., the Reactor Vessel, Steam Generators and Pressurizers are designed for 13,200 cycles, where the Class 1 piping is

designed for 18,300 cycles. The most limiting value of these major components is used as a monitoring limit in the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1.

2. For the design transients of Unit load and unload between 0% to 15% of full power, the Reactor Vessel, Steam Generators and Class 1 piping are designed for 500 cycles, where the Pressurizer is designed for 1,510 cycles. The most limiting value of these major components is used as a monitoring limit in the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1.
3. For the design transient of Reactor Coolant Pump startup/shutdown, the limit specified in the UFSAR is 3800 cycles. The Pressurizer is designed for 4,000 cycles, where Steam Generators are designed for 3,000 cycles. The Steam Generators has the most limiting value (3,000 cycles) of these components is used as a monitoring limit in the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1.

Each Seabrook component designed in accordance with ASME Section III, Class 1 rules was analyzed and shown to have a CUF less than the design limit of 1.0. Since each Class 1 fatigue analysis is based upon a number of cycles postulated to bound 40 years of service, they have been identified as TLAAs that require evaluation for 60 years.

Analysis

In order to determine if the ASME Section III, Class 1 fatigue analyses will remain valid for 60 years of service, a review of fatigue monitoring data was performed to determine the number of cumulative cycles for each transient type that have occurred during past plant operations. Then, the average rate of occurrence was determined, and predictions of future transient occurrences were made. For each transient type, the 60-year projected number of occurrences was determined by adding the number of past occurrences to the number of predicted future occurrences. These 60-year projections were then compared to the number of design cycles used in the fatigue analyses to determine if the design cycles remain bounding for 60 years of operations. If the 60-year projected numbers of cycles is less than the number of cycles used in the design fatigue analyses, then the fatigue analyses based upon the design transients will remain valid for 60 years of operation, if the design transient severity is also bounding of the actual transient severity.

Therefore, an evaluation was performed to determine if the severity of the actual plant transients that have occurred during past operations remains bounded by the transient severity provided for each transient definition in the design specification. This evaluation was to assure that the past cycles were appropriately characterized during fatigue monitoring activities in the past. The administrative and operating procedures were also reviewed in order to assess the effectiveness of the design transient cycle counting program and to validate the cyclic assumptions. This evaluation determined that the actual transient severity was bounded by the design transient severity for each transient type. The cycle counting procedure was also determined to have been effective in properly characterizing actual plant transients.

The overall conclusion of these evaluations is that the existing design transients bound transients projected for 60 years of plant operations.

60-Year Transient Projection Methodology

Projection Methodology

For Seabrook Station, the baseline period started on August 19, 1990 and ended on April 1, 2009, a total of 18.6 calendar years. For each transient type, the average rate of occurrence was determined by dividing the cumulative number of occurrences as of April 1, 2009 by 18.6 years of past operation. For each transient type, future cycles were predicted by multiplying the average rate of past occurrences by the number of calendar years remaining between April 1, 2009 and March 15, 2050. The 60-year projection was determined by adding the cumulative number of occurrences as of April 1, 2009 to the number of cycles predicted to occur in the 41 years of future operation. This methodology is considered to produce a conservative estimate of cycle values due to the declining trend of most of the transients since the beginning of plant operation.

Testing Events

One cycle has occurred for the following plant events:

- Turbine Roll Test
- Primary Side Leakage Test
- RCS Hydrostatic Pressure Test
- Secondary Side Leakage Test
- Tube Leakage Test
- Secondary Side Hydrostatic Pressure Test

These cycles occur before initial startup or during component installation and then typically do not occur again in the plant's lifetime. Therefore, the 60-year cycle projection for these events was taken as the current cycle count of one.

Events with Zero Cycles

No cycles have occurred for the following plant events:

- Operating Basis Earthquake
- RCS Loop Out of Service

- Inadvertent RCS Depressurization
- Inadvertent startup of inactive loop
- Excessive Feedwater Flow
- Reactor Trip with cooldown and safety injection
- Partial Loss of Flow
- Inadvertent Reactor Coolant Pump Startup
- RCS Cold Overpressurization

These events occur infrequently over the lifetime of a plant. Therefore, one cycle was predicted for the 60-year cycle projection for each of these plant events. The only exception is RCS Loop Out of Service. It is assumed to have zero cycles occur for the 60-year cycle projection, because the plant is not licensed to operate in this state.

Relatively Frequent Events

The following plant events occur frequently over the course of the lifetime of a plant:

- Feedwater Cycling
- RCP Startup and RCP Shutdown

The 60-year cycle projection for the RCP Startup and Shutdown cycles was linearly extrapolated based on the rate of accumulation for the data available through April 1, 2009 and additional 10% of cycles were included to accommodate any slight increase in occurrence over the years up to 60 years. The Feedwater Cycling events were not counted in the plant records and were prorated annually on the basis of the design number of cycles as the design number provides a conservative estimate for the non-monitored events considered.

Relatively Infrequent Events

The following plant events occur infrequently over the course of the lifetime of a plant:

- Step Load Increase ≤ 10%
- Step Load Decrease ≤ 10%

- Large Step Load Decrease with Steam Dump
- Unit Loading Between 0% and 15% Power
- Unit Unloading Between 0% and 15% Power
- Loss of Load without Immediate Reactor Trip
- Loss of Power
- Reactor Trip with cooldown but not safety injection
- Control Rod Drop
- Inadvertent Safety Injection (SI) Actuation
- Auxiliary Spray Actuation

The 60-year cycle projection for these events was linearly extrapolated based on the rate of accumulation for the data available through 4/1/2009.

Fatigue-Insignificant Events

Steady State Fluctuation and Boron Concentration Equalization occur frequently over the course of the lifetime of a plant, but have an insignificant effect on fatigue usage for any Class 1 component. No 60-year cycle projection is made for these events and they are not included Table 4.3.1-3.

Table 4.3.1-3 60-Year Design Transient Projections for NSSS Class 1 Components at Seabrook Station			
Transient	**Current Cycles (through 4/1/2009 – 18.6 Years of Operation)**	**60-Year Projected Cycles**	**NSSS Design Cycles**
Normal Condition Transients:			
Plant Heatup ≤ 100°F/hr	27	87	200
Plant Cooldown ≤ 100°F/hr	26	84	200
Pressurizer Cooldown ≤ 200°F/hr	36	116	200
Unit Loading @ 5%/min	104	334	13,200
Unit Unloading @ 5%/min	80	257	13,200
Step Load Increase of 10% of full Power	1	4	2,000
Step Load Decrease of 10% of full Power	3	10	2,000
Large Step Load Decrease (50%) with Steam Dump	4	13	200
Unit Loading Between 0% and 15% Power	27	13	500
Unit Unloading Between 0% and 15% Power	26	10	500
RCP Startup	152	536	3,000 (4)
RCP Shutdown	152	536	3,000 (4)
Feedwater Cycling at Hot Shutdown	620 (1)	2,000	2,000 (5)
Loop out of service	0 (2)	1 (2)	80
Feedwater Heaters out of service	12	39	120 (5)
Refueling	12	39	80
Reduced Temperature Return to Power	0	1	2,000
Upset Condition Transients:			
Loss of Load without Immediate Reactor Trip	2	7	80
Loss of Power	2	7	40
Partial Loss of Flow	0	1	80
Reactor Trip from Full Power			
Reactor Trip – no cooldown	30	97	230
Reactor Trip - With cooldown, without safety injection	2	7	160
Reactor Trip - With cooldown,	0	1	10

Table 4.3.1-3 60-Year Design Transient Projections for NSSS Class 1 Components at Seabrook Station			
Transient	**Current Cycles (through 4/1/2009 – 18.6 Years of Operation)**	**60-Year Projected Cycles**	**NSSS Design Cycles**
and safety injection			
Inadvertent Auxiliary Spray to Pressurizer	2	7	10
Inadvertent RCS Depressurization	0	1	20
Inadvertent startup of inactive loop	0	1	10
Control Rod Drop	1	4	80
Inadvertent Safety Injection Actuation (SI)	1	3	60
Operating Basis Earthquake	0	10 (3)	50
Excessive Feedwater Flow	0	1	30
Test Condition Transients:			
Turbine Roll Test	1	1	20
Primary Side Hydrostatic Test	1	1	10
Secondary Side Hydrostatic Test	1	1	10
Primary Side Leak Test	1	1	200
Secondary Side Leak Test	1	1	80
Tube Leak Test	1	1	800

(1) Prorated on the basis of the design number of events occurring in 60 years.

(2) Zero cycles assumed because the event is not allowed by procedure. One cycle is projected to occur during 60 years

(3) One earthquake with 10 cycles

(4) For the design transient of Reactor Coolant Pump startup/shutdown, the limit specified in the UFSAR is 3800 cycles. The Pressurizer is designed for 4,000 cycles, where Steam Generators are designed for 3,000 cycles. The Steam Generators has the most limiting value (3,000 cycles) of these components is used as a monitoring limit in the Metal Fatigue of Reactor Coolant Pressure Boundary Program (B.2.3.1).

(5) The plant does not monitor these events. The original design analysis number is assumed to be the anticipated number of cycles at the end of the period of extended operation. Cycles shown in the current cycles column (column 2) represent a review of plant records to validate assumption.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The 40-year design transients bound the numbers of cycles projected to occur during 60 years of plant operations at Seabrook Station. Therefore, the NSSS Class 1 fatigue analyses that are based upon the 40-year design transients remain valid for the period of extended operation.

4.3.2 SUPPLEMENTARY ASME SECTION III, CLASS 1 PIPING AND COMPONENT FATIGUE ANALYSES

Summary Description

In addition to the original design assumptions, the Seabrook Station Pressurizer fatigue evaluations were updated to include the added thermal stratification effects of insurge and outsurge events on the pressurizer lower head and surge nozzle. These new conditions did not change the number of original design cycles, but rather incorporated the effects as new sub-events within the original design transients.

Each of the Seabrook Station piping systems, including the Reactor Coolant System main loop piping, were originally designed in accordance with ASME Section III 1971 Edition with addenda through Winter 1972. Since then, a number of updated fatigue analyses have been prepared for piping systems and components to address transients that have been identified in the industry that were not originally considered. These analyses have been performed in accordance with ASME Section III, Class 1 rules to enable these transients to be thoroughly evaluated. These transients include those associated with potential valve leakage transients identified in NRC Bulletin 88-08 for the auxiliary spray line, charging lines, safety injection lines, and thermal stratification of the pressurizer surge line, as described in NRC Bulletin 88-11.

These analyses are separated from those evaluated in the previous sections because the transient definitions have been modified, or additional transients have been postulated for these components, in addition to those previously described. Therefore, the cycle projections for these components must address these revised transients or additional transient types to determine if they also remain bounded for 60 years of service. Each of these analyses is dispositioned separately within this section for clarity.

4.3.2.1 Absence of a TLAA for Thermal Stresses in Piping Connected to Reactor Coolant Systems: NRC Bulletin 88-08

Summary Description

NRC Bulletin 88-08 "*Thermal Stresses in Piping Connected to Reactor Cooling Systems"* was issued June 22, 1988, because of observed pipe cracking due to valve leakage in unisolable lines. Three supplements were issued on June 24, 1988, August 4, 1988, and April 11, 1989, respectively. The Bulletin and supplements required licensees to identify potential locations that might be subject to high thermal stresses either from thermal stratification or temperature oscillations due to leaking valves and inspect the potential locations to assure that susceptible locations will not fail for the remaining life of the unit.

Seabrook Station evaluated the effects of thermal stresses due to leaking valves in seven piping sections that are unisolable from the RCS that were pressurized by the charging pumps and could potentially experience in-leakage to the RCS from leaking valves. Prior to initial criticality, a one-time non-destructive examination was performed for the four high head safety injection lines with acceptable results. A temperature monitoring program was deployed for potentially susceptible lines. The monitoring is still installed and credited in the Seabrook Station Management of Thermal Fatigue Program for Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines (MRP-146/146S).

The NRC approved Seabrook Station's response to NRC Bulletin 88-08.

Analysis

NRC Bulletin 88-08 and Supplements 1 and 2 addressed the evaluation of thermal stresses in unisolable piping from cold fluid in-leakage to the RCS through leaking valves. NRC Bulletin 88-08 Supplement 3 addressed the evaluation of thermal stresses in unisolable piping from hot fluid out-leakage from the RCS through leaking valves.

Seabrook Station evaluated the possibility and effects of fluid in-leakage by identifying seven piping sections that are unisolable from the RCS and pressurized by the charging pumps where the effects of thermal stresses due to leaking valves could potentially experience in-leakage to the RCS from leaking valves. Four of these lines are the high head safety injection lines and three of these lines are charging system lines (the normal and alternate charging loop charging lines and the pressurizer auxiliary spray line).

In 1988, prior to initial criticality, a one-time non-destructive examination was performed for the four high head safety injection lines, which showed acceptable results. Non-destructive examinations were not considered to be necessary for the three charging system lines because they had not yet been subjected to excessive thermal cycling at that time.

Seabrook Station deployed a temperature monitoring program for the high head safety injection lines and three charging system lines in 1989, prior to initial criticality. This program installed temperature detectors on the unisolable piping sections to detect adverse temperature distributions, and established appropriate temperature limits, requirements for periodic review of the temperature instrument values and action limits in the event of exceeding the temperature limit.

Seabrook Station evaluated the possibility and effects of fluid out-leakage and concluded that unisolable piping sections connected to the Reactor Coolant System at Seabrook Station are not subject to stresses from thermal stratification or temperature oscillations resulting from the mechanism described in NRC Bulletin Supplement 3. There is no specific TLAA for these seven locations addressed by NRC Bulletin 88-08 and related supplements.

Conclusion

Unisolable piping sections connected to the Reactor Coolant System at Seabrook Station are not subject to stresses from thermal stratification or temperature oscillations resulting from the mechanism described in NRC Bulletin 88-08 and related supplements. There is no specific TLAA for locations addressed by NRC Bulletin 88-08 and related supplements.

4.3.2.2 NRC Bulletin 88-11, Pressurizer Surge Line Thermal Stratification

Summary Description

NRC Bulletin 88-11, issued on December 20, 1988, requested utilities to establish and implement a program to confirm the integrity of the pressurizer surge line. The program required both visual inspection of the surge line and demonstration that the design requirements of the surge line are satisfied, including the consideration of stratification effects.

The Pressurizer Surge Line piping and nozzles were previously evaluated for the effects of thermal stratification and plant-specific transients (1990) and it was determined that the surge line will remain within the ASME Code requirements for the design life of the unit. The controlling fatigue location was the hot leg surge line nozzle safe-end. In later evaluations, plant-specific ASME Section III, Class 1 evaluations were performed for the hot leg surge line nozzle and pressurizer surge nozzle.

Hot Leg Surge Line Nozzle

The hot leg surge line nozzle was evaluated for the effects of pressurizer insurge and outsurge transients and surge line stratification. This evaluation was part of an evaluation of reactor water environmental effects on the surge line. The model from that analysis was also used to evaluate the design cycles for the NSSS transients and projected 60-year cycles of surge line stratification and insurge and outsurge transients, to calculate CUF at the hot leg surge line nozzle, without environmentally-assisted fatigue effects. Since the analysis envelopes the 60-year cycles, it remains valid for 60 years. The evaluation incorporating these models in the evaluation of environmentally-assisted fatigue is described further in section 4.3.4 Environmentally-Assisted Fatigue Analyses

Pressurizer Surge Nozzle

The pressurizer surge nozzle was evaluated for the effects of pressurizer insurge and outsurge transients and surge line stratification. This evaluation was part of an evaluation of the structural weld overlay applied to the pressurizer surge nozzle. The model from that analysis was also used to evaluate the design cycles for the NSSS transients and design cycles of surge line stratification and insurge and outsurge transients, to calculate CUF at the pressurizer surge nozzle. Since the analysis envelopes the 60-year cycles, it remains valid for 60 years.

Analysis

Hot Leg Surge Line Nozzle

The hot leg surge line nozzle has been evaluated using an ASME Section III, Class 1 fatigue analysis. This analysis was part of the evaluation of the environmental effects of reactor coolant (Section 4.3.4). In addition, that analysis was used to evaluate CUF without environmental effects. The analysis performed to demonstrate compliance with design requirements considered ASME Code requirements and utilized the design set of NSSS transients. Pressurizer surge line stratification sub-transients were developed based on NSSS-vendor Seabrook Station-specific evaluations for pre-MOP (Modified Operating Procedure) plant operating procedures and NSSS-vendor evaluations of surge line monitoring data from similar units and historical records for Seabrook Station for post-MOP operating procedures. Projected 60-year cycles of surge line stratification and insurge and outsurge transients were used when these were greater than previously evaluated design cycles. These evaluations resulted in CUF less than 1.0 at the hot leg surge line nozzle.

Pressurizer Surge Nozzle

The pressurizer surge nozzle has been evaluated using an ASME Section III, Class 1 fatigue analysis. This analysis was part of the evaluation of the structural weld overlay applied to the pressurizer surge nozzle. The analysis performed to demonstrate compliance with design requirements considered ASME Code requirements and utilized the design set of NSSS transients and surge line stratification sub-transients were developed based on NSSS-vendor Seabrook Station specific evaluations for pre-MOP operating plant operating procedures and NSSS-vendor evaluations of surge line monitoring data from similar units and historical records for Seabrook for post-MOP operating procedures. This evaluation included an elastic-plastic formulation and resulted in CUF less than 1.0 at the pressurizer surge nozzle.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation for the Pressurizer Surge Line, Pressurizer Surge Nozzle and Hot Leg Surge Line Nozzle

4.3.3 REACTOR VESSEL INTERNALS AGING MANAGEMENT

Summary Description

The Seabrook Station Reactor Vessel Internals were designed and constructed prior to the development of ASME Code requirements for core support structures, but the reactor coolant system functional design requirements were considered in the design. The Reactor Vessel Internals were further analyzed for fatigue as part of the Seabrook Station power uprate and determined that cumulative usage factors would remain less than 1.0.

Demonstration that the effects of aging are adequately managed is essential for assuring continued functionality of the reactor internals during the desired plant operating period, including license renewal. The recently-published EPRI Materials Reliability Program (MRP) Reactor Internals Inspection & Evaluation (I&E) Guidelines, MRP-227, are intended to support that demonstration, with requirements for inspection to detect the effects of aging degradation.

Analysis

The mechanisms of aging of PWR internals are described below:

Stress Corrosion Cracking

Stress Corrosion Cracking (SCC) refers to local, non-ductile cracking of a material due to a combination of tensile stress, environment, and metallurgical properties. The actual mechanism that causes SCC involves a complex interaction of environmental and metallurgical factors. The aging effect is cracking.

Irradiation-Assisted Stress Corrosion Cracking

Irradiation-assisted stress corrosion cracking (IASCC) is a unique form of SCC that occurs only in highly-irradiated components. The aging effect is cracking.

Wear

Wear is caused by the relative motion between adjacent surfaces, with the extent determined by the relative properties of the adjacent materials and their surface condition. The aging effect is loss of material.

Fatigue

Fatigue is defined as the structural deterioration that can occur as the result of repeated stress/strain cycles caused by fluctuating loads and temperatures. After repeated cyclic loading of sufficient magnitude, microstructural damage can accumulate, leading to macroscopic crack initiation at the most highly affected locations. Subsequent mechanical or thermal cyclic loading can lead to growth of the initiated crack. Corrosion fatigue is included in the degradation description.

Low-cycle fatigue is defined as cyclic loads that cause significant plastic strain in the highly stressed regions, where the number of applied cycles is increased to the point where the crack eventually initiates. When the cyclic loads are such that significant plastic deformation does not occur in the highly stressed regions, but the loads are of such increased frequency that a fatigue crack eventually initiates, the damage accumulated is said to have been caused by high-cycle fatigue. The aging effects of low-cycle fatigue and high-cycle fatigue are additive. Fatigue crack initiation and growth resistance is governed by a number of material, structural and environmental factors, such as stress range, loading frequency, surface condition and presence of deleterious chemical species. Cracks typically initiate at local geometric stress concentrations, such as notches, surface defects, and structural discontinuities. The aging effect is cracking.

Thermal Aging Embrittlement

Thermal aging embrittlement is the exposure of delta ferrite within cast austenitic stainless steel (CASS) and precipitation-hardenable stainless steel to high inservice temperatures, which can result in an increase in tensile strength, a decrease in ductility, and a loss of fracture toughness. Some degree of thermal aging embrittlement can also occur at normal operating temperatures for CASS and precipitation-hardenable stainless steel internals. CASS components have a duplex microstructure and are particularly susceptible to this mechanism. While the initial aging effect is loss of ductility and toughness, unstable crack extension is the eventual aging effect if a crack is present and the local applied stress intensity exceeds the reduced fracture toughness.

Irradiation Embrittlement

Irradiation embrittlement is also referred to as neutron embrittlement. When exposed to high energy neutrons, the mechanical properties of stainless steel and nickel-base alloys can be changed. Such changes in mechanical properties include increasing yield strength, increasing ultimate strength, decreasing ductility, and a loss of fracture toughness. The irradiation embrittlement aging mechanism is a function of both temperature and neutron fluence. While the initial aging effect is loss of ductility and toughness, unstable crack extension is the eventual aging effect if a crack is present and the local applied stress intensity exceeds the reduced fracture toughness.

Void Swelling and Irradiation Growth

Void swelling is a gradual increase in the volume of a component caused by formation of microscopic cavities in the material. These cavities result from the nucleation and growth of clusters of irradiation produced vacancies. Helium produced by nuclear transmutations can have a significant impact on the nucleation and growth of cavities in the material. Void swelling may produce dimensional changes that exceed the tolerances on a component. Strain gradients produced by differential swelling in the system may produce significant stresses. Severe swelling (>5% by volume) has been correlated with extremely low fracture toughness values. Also included in this description is irradiation growth of anisotropic materials, which is known to cause significant dimensional changes in in-core instrumentation tubes, fabricated from zirconium alloys. While the initial aging effect is dimensional change and distortion, severe void swelling may result in cracking under stress.

Thermal and Irradiation-Enhanced Stress Relaxation or Irradiation-Enhanced Creep

The loss of preload aging effect can be caused by the aging mechanisms of stress relaxation or creep. Thermal stress relaxation (or, primary creep) is defined as the unloading of preloaded components due to long-term exposure to elevated temperatures, such as seen in PWR internals. Stress relaxation occurs under conditions of constant strain where part of the elastic strain is replaced with plastic strain. Available data show that thermal stress relaxation appears to reach saturation in a short time (< 100 hours) at PWR internals temperatures.

Creep (or more precisely, secondary creep) is a slow, time and temperature dependent, plastic deformation of materials that can occur when subjected to stress levels below the yield strength (elastic limit). Creep occurs at elevated temperatures where continuous deformation takes place under constant strain. Secondary creep in austenitic stainless steels is associated with temperatures higher than those relevant to PWR internals even after taking into account gamma heating. However, irradiation-enhanced creep (or more simply, irradiation creep) or irradiation enhanced stress relaxation (ISR) is an athermal process that depends on the neutron fluence and stress; and, it can also be affected by void swelling should it occur. The aging effect is a loss of mechanical closure integrity (or, preload) that can lead to unanticipated loading which, may eventually cause subsequent degradation by fatigue or wear and result in cracking.

Disposition

Aging Management, 10 CFR 54.21(c)(1)(iii) The PWR Vessel Internals Program, B.2.1.7 will manage the aging effects including changes in dimensions, cracking, loss of fracture toughness, and loss of preload of the Reactor Vessel Internals components for the period of extended operation per 10 CFR 54.21(c)(1)(iii).

4.3.4 ENVIRONMENTALLY-ASSISTED FATIGUE ANALYSES

Summary Description

Environmentally-assisted fatigue analyses do not meet the definition of time-limited aging analyses under 10 CFR 54.3 because they are not contained or incorporated by reference in Seabrook Station's current licensing basis. This subsection is included in response to the request in NUREG-1800 that license renewal applicants address the effects of the coolant environment on component fatigue life as aging management programs are formulated in support of license renewal. This discussion of environmentally-assisted fatigue calculations is provided, in accordance with NUREG-1800, to assist with the formulation of aging management programs.

NUREG-1801, Revision 1, Generic Aging Lessons Learned, contains recommendations on specific areas for which existing programs should be augmented for license renewal. The program description for Aging Management Program X.M1, Metal Fatigue of Reactor Coolant Pressure Boundary Program, provides guidance for addressing environmental fatigue for license renewal. It states that an acceptable program addresses the effects of the reactor coolant environment on component fatigue life by assessing the impact of the reactor coolant environment on a sample of critical components for the plant. Examples of these components are identified in NUREG/CR-6260, "*Application of* NUREG/CR-5999 *Interim Fatigue Curves to Selected Nuclear Power Plant Components*".

This sample of components can be evaluated by applying environmental life correction factors to the existing ASME Code fatigue analyses using formulae contained in NUREG/CR-6583, "*Effects of LWR Coolant Environments on*

Fatigue Design Curves of Carbon and Low Alloy Steels" and in NUREG/CR-5704, "*Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels*". Demonstrating that these components have an environmentally adjusted cumulative usage factor less than or equal to the design limit of 1.0 for the 60-year period of extended operation is an acceptable option for managing metal fatigue for the reactor coolant pressure boundary. Another acceptable option is to manage fatigue of these components in the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1 by tracking the number and severity of plant transients to compare to the established trigger number for each plant transient. Under the B.2.3.1 option, when the counted number of a specific plant transient reaches the trigger number associated with that specific plant transient, a preemptive remedial action will be undertaken appropriate to the plant transient and the components affected by it. This remedial action may encompass one of several activities, as described in B.2.3.1:

1. Reanalyze affected components for an increase in the number of that specific transient while accounting for other component-affecting plant transients that may be projected not to achieve their analyzed levels.

2. Perform a fracture mechanics evaluation of a postulated flaw in affected plant components, which when coupled with an inservice inspection program, will serve to demonstrate flaw tolerant behavior.

3. Repair the affected component.

4. Replace the affected component.

NUREG/CR-6260 provides environmental fatigue calculations for a newer vintage Westinghouse plant (like Seabrook Station) using the interim fatigue curves from NUREG/CR-5999 for the locations of highest design CUF for the components listed below:

- Reactor Vessel Shell and Lower Head

- Reactor Vessel Inlet and Outlet Nozzles

- RCS Pressurizer Surge Line

- RCS Charging Nozzle

- RCS Safety Injection Nozzle

- RCS Residual Heat Removal System Class 1 Piping

Analysis

For the NUREG/CR-6260 locations identified above, the plant-specific components were identified and the design ASME fatigue usage factors were adjusted by the environmentally-assisted fatigue penalty factors (F_{en}) to obtain the environmentally-assisted fatigue (EAF) results for the RV Inlet and Outlet Nozzles, RV Shell and Lower Head and RHR Hot Leg Nozzle.

Table 4.3.4-1 summarizes the locations where ASME 60-Year air-curve and EAF results were calculated as well as the results. All locations were shown to achieve air-curve cumulative usage factors less than 1.0 for the 60 years of service. The evaluations show that 60-year EAFs exceed 1.0 for 60 years of service for the hot leg surge line nozzle and charging nozzle.

In the EAF evaluations for Hot Leg Surge Nozzle, Charging Nozzle and Safety Injection Nozzle, F_{en} factors for each transient pair were calculated using the integrated strain rate method from MRP-47, Rev. 1.

The Effective F_{en} Multipliers shown in Table 4.3.4-1 for Hot Leg Surge Nozzle, Charging Nozzle and Safety Injection Nozzle, were computed as (Environmentally-Assisted Fatigue CUF) / (Air-Curve CUF).

Table 4.3.4-1

60 Year Air-Curve and Environmentally-Assisted Fatigue Results

Component	60 Year ASME Air-Curve CUF	Effective F_{en} Multiplier	60-Year EAF-adjusted CUF	Material Type (6)	DO (7)	T (8)
1. Reactor Vessel Shell and Lower Head (1)						
Inside surface of lower head near shell-to-head junction (2)(4)	0.007	2.455(9)	0.0172	LAS	< 50 ppb	> 200°C
2. Reactor Vessel Inlet and Outlet Nozzles (1)						
Reactor vessel inlet nozzle (2)(4)	0.0795	2.455(9)	0.195	LAS	< 50 ppb	> 200°C
Reactor vessel outlet nozzle (2)(4)	0.1077	2.455(9)	0.264	LAS	< 50 ppb	> 200°C
3. Pressurizer Surge Line (1)						
Hot leg surge nozzle-to-pipe weld (2)(3) **(5)**	0.2844	12.05	3.428	SS	< 50 ppb	> 200°C
4. Charging Nozzle (1)						
Charging nozzle near blend radius (2)(3) **(5)**	0.9671	5.66	5.471	SS	< 50 ppb	> 200°C
5. Safety Injection Nozzle (1)						
BIT nozzle near blend radius (2)(3) **(5)**	0.112	3.49	0.390	SS	< 50 ppb	> 200°C
6. RHR System Class 1 Piping (1)						
RHR hot leg nozzle-to-pipe weld (2)(4)	0.0407	15.35(10)	0.625	SS	< 50 ppb	> 200°C

(1) NUREG/CR-6260 Component Location for a Newer Vintage Westinghouse Plant

(2) Plant-specific limiting location within the boundary of the applicable NUREG/CR-6260 Component Location

(3) Analysis performed using 60-year projected cycles

(4) Analysis performed using design number of design-severity cycles

(5) The Effective F_{en} Multiplier is computed to be (Environmentally-Assisted Fatigue CUF) / (Air-Curve CUF)

(6) LAS = Low Alloy Steel; SS = Stainless Steel

(7) DO – dissolved oxygen for EAF computation

(8) T – maximum service temperature for EAF computation

(9) The Effective F_{en} Multiplier is computed based on the maximum value from NUREG/CR-6583

(10) The Effective F_{en} Multiplier is computed based on the maximum value from NUREG/CR-5704

Disposition

Revision 10 CFR 54.21(c)(1)(ii) The evaluation of environmental fatigue effects for the Reactor Vessel Shell and Lower Head and Reactor Vessel Inlet and Outlet Nozzles determined that the CUF will remain below the ASME code allowable fatigue limit of 1.0 using the maximum applicable F_{en}, applied to CUF based on the design number of transients for these locations, when extended to 60 years. The evaluation of fatigue effects for these locations has thereby been validated for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(i), including effects of the reactor coolant environment. Therefore, no aging management program is necessary to address environmentally-assisted fatigue for these components.

Aging Management 10 CFR 54.21(c)(1)(iii) The remainder of these locations, RCS Pressurizer Surge Line Nozzle, RCS Charging Nozzle, RCS Safety Injection Nozzle, and RCS Residual Heat Removal System Class 1 Piping, were analyzed in accordance with ASME Code Section III, Subarticle NB-3200 using all six stress components. These analyses were based on Seabrook Station Specific conditions and these locations will be monitored for fatigue usage including environmental effects by the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1. Specifically, this program will monitor critical transients to verify cycle limits are maintained below limits specified in the UFSAR. Pre-established action limits will permit completion of corrective actions before the design basis number of events is exceeded, and before the cumulative usage factor, including environmental effects, exceeds the AMSE Code limit of 1.0.

At least 2 years prior to entering the period of extended operation, Seabrook Station will implement the following aging management program for the plant-specific locations listed in NUREG/CR-6260 for the newer vintage Westinghouse plants.

(1) Consistent with the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1 Seabrook Station will update the fatigue usage calculations using refined fatigue analyses, if necessary, to determine acceptable CUFs (i.e., less than 1.0) when accounting for the effects of the reactor water environment. This includes applying the appropriate F_{en} factors to valid CUFs determined from an existing fatigue analysis valid for the period of extended operation or from an analysis using an NRC-approved version of the ASME Code or NRC-approved alternative (e.g., NRC-approved code case). Formulas for calculating the environmental life correction factors for carbon and low alloy steels are contained in NUREG/CR-6583 and those for austenitic stainless steels are contained in NUREG/CR-5704. NUREG/CR-6909 includes alternate formulas for calculating environmental life correction factors, in addition to updated fatigue design curves.

(2) If acceptable CUFs cannot be demonstrated for all the selected locations, then additional plant-specific locations will be evaluated. For the additional plant-specific locations, if CUF, including environmental effects is greater than 1.0, then Corrective Actions will be initiated, in accordance with the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1. Corrective Actions will include inspection, repair, or replacement of the affected locations before exceeding a CUF of 1.0 or the effects of fatigue will be managed by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method accepted by the NRC).

Therefore, the effects of the reactor coolant environment on fatigue usage factors in the remaining locations will be managed for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.5 STEAM GENERATOR TUBE, LOSS OF MATERIAL AND FATIGUE USAGE FROM FLOW-INDUCED VIBRATION

Summary Description

The Seabrook Station Model F steam generators were evaluated with respect to flow induced vibration (tube wear and fatigue usage) for the power increases that were implemented as part of the Seabrook Station Power Uprates. The analysis of the effects of steam generator flow-induced vibration on tube wear and fatigue usage assumed 40 years of operation.

Analysis

The maximum predicted tube wall wear for a 40-year operating life was 0.0032 inch for the pre-power uprate conditions. As a result of the 56% increase in the tube wear rate as a result of the power uprates, the maximum 40-year tube wall wear is less than 0.0050 inch. The maximum 60-year tube wall wear is 0.0075 inch (~20% through-wall wear). This amount of tube wall wear is less than the limit of acceptability of 40% of wall thickness and is deemed not to significantly affect tube integrity.

The evaluation showed that significant levels of tube vibration will not occur from either the fluidelastic or turbulent mechanisms above those associated with the pre-uprated condition.

Low-cycle fatigue usage for the most limiting tube in the most limiting power-uprated operating condition resulting from the flow-induced vibration tube bending stress is 0.2 ksi. This value is well below the fatigue endurance limit of 20 ksi at 1E+11 cycles, resulting in a computed fatigue usage of 0.0. High-cycle fatigue usage of U-bend tubes was evaluated. One of the prerequisites for high-cycle U-bend fatigue is a dented support condition at the upper plate. Seabrook Station steam generator tube support plates are manufactured from stainless steel therefore there is no potential for the necessary conditions to occur. It was concluded that the support condition leading to a dented support condition necessary for high-cycle fatigue cannot occur in the Model F steam generators.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.3.6 ABSENCE OF TLAAS FOR FATIGUE CRACK GROWTH, FRACTURE MECHANICS STABILITY, OR CORROSION ANALYSES SUPPORTING REPAIR OF ALLOY 600 MATERIALS

Summary Description

Both Alloy 600 base material and Alloy 82/182 weld material have exhibited susceptibility to primary water stress corrosion cracking (PWSCC). Evaluations of these effects, or analyses in support of repairs to affected locations, can be TLAAs.

Analysis

Pressurizer

The pressurizer contains Alloy 600 material only as Alloy 82/182 welds attaching the surge, spray, and relief valve nozzles to the safe ends, and the safe ends to the connecting piping. Complete Alloy 690 structural weld overlays were completed on all of these locations during Refueling Outage 12 (Spring 2008). The overlays were supported by fatigue crack growth analyses. These fatigue crack growth analyses were projected for a 60-year life, to the end of the period of extended operation, and are therefore not TLAAs.

No base-metal corrosion analyses exist for the pressurizer, since no half-nozzle or similar repairs have exposed the base metal to reactor coolant.

Reactor Vessel

A reactor vessel hot leg nozzle Alloy 600 weld was mitigated through Mechanical Stress Improvement Process (MSIP) repair during Outage 13 (Fall 2009). The MSIP repair was supported by fatigue crack growth analysis. This fatigue crack growth analysis was projected, to the end of the period of extended operation, and is therefore not a TLAA.

There have been no other MSIP, Mechanical Nozzle Seal Assembly (MNSA), half-nozzle, or weld overlay repairs to reactor vessel Alloy 600 nozzle locations. Since there have been no MSIP, MNSA, half-nozzle, or weld overlay repairs to reactor vessel Alloy 600 nozzle locations, no other TLAA exists supporting their installation.

Steam Generators

The steam generator channel head drains (a/k/a bowl drains) contain Alloy 600 material. The channel head drains will be inspected periodically until the susceptible material is mitigated by replacing the alloy 600 welds.

Conclusion

No TLAAs for Fatigue Crack Growth, Fracture Mechanics Stability, or Corrosion Analyses Supporting Repair of Alloy 600 Materials exist for Seabrook Station. Components containing Alloy 600 material are monitored in accordance with B.2.1.1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program.

4.3.7 NON-CLASS 1 COMPONENT FATIGUE ANALYSES

This section describes fatigue-related TLAAs arising within design analyses of the Non-Class 1 piping and components. These piping and tubing components can be designed in accordance with ASME Section III Class 2 and 3.

Summary Description

Non-Class 1 piping designed in accordance with ASME Code Section III Class 2 and 3 Piping is not required to have an analysis of cumulative fatigue usage, but cyclic loading is considered in a simplified manner in the design process. When the non-Class 1 Seabrook Station components were designed, the overall number of thermal and pressure cycles expected during the 40-year lifetime of these components was determined. The total number of cycles expected during 40 years was compared to cycle ranges specified in ASME Section III Class 2 and 3 design codes for consideration of allowable stress reduction. If the total number of cycles exceeded 7,000 cycles, a stress range reduction factor was applied to the allowable stress range for secondary stresses (expansion and displacement) to account for thermal cycling. This method is considered to be an implicit fatigue analysis because it is based upon a total number of cycles projected to occur in 40 years, but no explicit Cumulative Usage Factor (CUF) is computed. Because the overall number of cycles could potentially increase during the period of extended operation, which could potentially result in further reduction of the allowable stress range, these implicit fatigue analyses are also considered to be TLAAs requiring evaluation for the period of extended operation.

The following non-Class 1 Seabrook Station systems that are in scope for license renewal were designed in accordance with ASME Section III Class 2 and 3 requirements:

- Reactor Coolant System (including primary loop piping and pressurizer surge line piping)
- Chemical and Volume Control System
- Safety Injection System
- Primary Component Cooling Water
- Service Water
- Sample System
- Residual Heat Removal System
- Main Steam System
- Condensate and Feedwater Systems
- Steam Generator Blowdown System

Analysis

In order to evaluate these TLAAs for 60 years, the number of cycles expected to occur within the 60-year operational period should be compared to the numbers of cycles that were originally considered in the design of these components. If the number of expected cycles does not exceed 7,000 cycles, the minimum number of cycles required that would result in reduction of the allowable stress range, then there is no impact from the added years of service and the original analyses remain valid. If the total number of cycles exceeds 7,000 cycles, then additional evaluation is required.

The 60-year transient projection results shown in Table 4.3.1-3 for Seabrook Station show that even if all of the projected operational transients are added together, the total number of cycles projected for 60 years will not exceed 7,000 cycles. Therefore, there is no impact upon the implicit fatigue analyses used in the component design for the systems designed to ASME Section III Class 2 and 3 requirements.

The Sample System thermal cycles do not trend along with operational cycles because sampling is required on a periodic basis, as opposed to an operational basis. However, only the portion of the sampling lines that constitutes piping need be considered here. In this case that portion turns out to be a very short section of piping directly connected to the RCS loop piping. Since this section of piping has no isolation valve and no bends, it is assumed to always be exposed to primary loop temperature and pressure condition. Similarly since there are no other external piping connections (only the tubing connection exits), the line will not experience any other externally applied loads. Therefore, that section of the sampling line that constitutes ASME Section III Class 2 and 3 piping will only experience the RCS loop transients which have already been shown to be less than 7,000 cycles and the line is, therefore, acceptable.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for 60 years of operation.

4.4 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC COMPONENTS

Summary Description

Thermal, radiation, and cyclical aging analyses of plant electrical and I&C components, developed to meet 10 CFR 50.49, "*Environmental qualification of electric equipment important to safety for nuclear power plants*" requirements, have been identified as time-limited aging analyses (TLAAs) for Seabrook Station. In accordance with 10 CFR 50.49, all electrical equipment important to safety located in a harsh environment and required to function in that environment must be environmentally qualified. In order for a component to have sufficient design margin to perform its important to safety function under harsh environment conditions, the component may need to be periodically rebuilt or replaced. For these EQ components, the EQ program insures that they are rebuilt, replaced or reevaluated at the necessary interval. All qualified lives of components within the scope of the EQ program are managed under the EQ Program.

The Seabrook Station Environmental Qualification (EQ) of Electric Components Program implements aging management activities which are credited for the management of aging in selected components within the scope of 10 CFR 54. The Seabrook Station EQ Program is an existing program that is consistent with NUREG-1801, Generic Aging Lessons Learned (GALL) report Section X.E1, "*Environmental Qualification (EQ) of Electric Components*". The program is administered in accordance with the Seabrook Station Environmental Qualification Manual, SSEQ.

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 Seabrook Station EQ Program that specify a qualification of at least 40 years are TLAAs for license renewal because the criteria contained in 10 CFR 54.3 are met.

Analysis

Under 10 CFR Part 54.21(c)(1)(iii), the Seabrook Station 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 Seabrook Station 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). 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 Standard Review Plan for License Renewal contains sections on "*EQ Component Reanalysis Attributes, Evaluation, and Technical Basis*" that is the basis of the description provided below.

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 Seabrook Station 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, unnecessarily low activation energy, in the state of a component (de-energized versus energized), or equipment operating times. The reanalysis of an aging evaluation is documented according to Seabrook Station 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 Seabrook Station EQ Program uses the same analytical models in the reanalysis of an aging evaluation as those 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, which is the 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. Seabrook has a specific 60 year radiation dose calculation prepared as part of the power up-rate project.

Data Collection & Reduction Methods

The chief method used for a reanalysis per the Seabrook Station EQ Program is reduction of excess conservatism in the component service conditions used in the prior aging evaluation, including temperature, radiation, and cycles. Temperature data used in an aging evaluation is conservative when based on plant design temperatures. Actual plant temperature data are 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 is 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 and documented via the design control program. 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

Seabrook Station 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 Actions

Under the Seabrook Station 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 such that sufficient time is available to refurbish, replace, or requalify the component if the reanalysis is unsuccessful.

Disposition

Aging Management, 10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended functions will be adequately managed for the period of extended operation. The Seabrook Station EQ Program has been demonstrated to be capable of programmatically managing the qualified lives of the components within the scope of the program for License Renewal. The continued implementation of the Seabrook Station EQ Program insures 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).

4.5 ABSENCE OF TLAA FOR CONCRETE CONTAINMENT TENDON PRESTRESS

Summary Description

The Seabrook Station Containment and Containment Enclosure Building structures are designed without the use of prestressed tendons. Tendons in presetressed concrete containments lose their prestressing forces over time due to creep and shrinkage of concrete, and relaxation of the prestressed steel tendons. This relaxation is predicted over the period of operating life. Operating experience with the trend of prestressing forces indicates that the prestressed tendons lose their prestressing forces at a rate higher than predicted due to sustained higher temperature. Thus, it is necessary to ensure that the rate of loss of prestressed forces is addressed as TLAAs for the period of extended operation.

Analysis

The Seabrook Station Unit 1 containment is a seismic Category I reinforced concrete dry structure, designed to function at atmospheric conditions. It consists of an upright cylinder topped with a hemispherical dome, supported on a reinforced concrete foundation mat keyed into the bedrock by the depression for the reactor pit and by continuous bearing around the periphery of the foundation mat.

Located outside the Containment Building and having a similar geometry is the Containment Enclosure Building. This structure provides leak protection for the containment and protects it from certain loads.

Conclusion

The Containment and Containment Enclosure Building structures are designed without the use of prestressed tendons. Loss of prestressing forces is not applicable to this containment, and therefore not a TLAA.

4.6 CONTAINMENT LINER PLATE FATIGUE USAGE AND CONTAINMENT PENETRATION PRESSURIZATION CYCLES

4.6.1 CONTAINMENT LINER PLATE FATIGUE USAGE

Summary Description

The Containment structure is designed to contain the radioactive material released in the unlikely event of a Loss of Coolant Accident (LOCA). A welded carbon steel liner is attached to the inside face of the concrete shell to provide a leak-tight membrane. Fatigue of the containment liner plate was considered in the original design based on the assumed number of loading cycles that would occur during the life of the plant and is therefore considered a TLAA.

Analysis

The original design analysis for the Seabrook Station containment liner plate determined that all of the criteria specified in ASME Section III Article NE-3221.5(d) required for exemption from the requirement to perform a cyclic operation analysis were met. The six criteria to support a fatigue exemption are:

(1) Atmospheric-to-Service Pressure Cycles

(2) Normal Service Pressure Fluctuations

(3) Temperature Difference – Startup and Shutdown

(4) Temperature Difference – Similar Material

(5) Temperature Difference – Dissimilar Materials

(6) Mechanical Loads

The Seabrook Station analyses confirmed the 40-year anticipated stress cycles listed below would satisfy the exemption criteria of NE 3221.5(d).

- Atmospheric-to-service pressure cycles (120 cycles)
- Temperature difference from Startup to Shutdown (120 cycles)
- Operating Basis Earthquake (500 cycles)
- LOCA (10 cycles)

To address these 40-year cycles during the period of extended operation, a re-evaluation of the six fatigue exemption requirements utilizing anticipated 60-year stress cycles specified below was performed.

- Atmospheric-to-service pressure cycles (180 cycles)
- Temperature difference from Startup to Shutdown (180 cycles)
- Operating Basis Earthquake (750 cycles)
- LOCA (15 cycles)

The result of this analysis determined that the specified conditions through the period of extended operation continue to satisfy the requirement for exemption from analysis for cyclic operation in accordance with in ASME Section III Article NE-3221.5(d).

Disposition

Revision, 10 CFR 54.21(c)(1)(ii) – The analysis has been projected to the end of the period of extended operation

4.6.2 PRESSURIZTAION CYCLES: PERSONNEL AIRLOCK, EQUIPMENT HATCH AND FUEL TRANSFER TUBE ASSEMBLY ABSENCE OF TLAA FOR CONTAINMENT PENETRATIONS

Summary Description

Similar to the steel Containment Liner Plate discussed in Section 4.6.1, containment penetrations are designed to ensure a leak-tight membrane to contain the radioactive material released in the unlikely event of a Loss of Coolant Accident (LOCA). The design of the containment penetrations did not involve cyclic evaluations and therefore are not considered TLAAs. Specific cyclic evaluations are listed in the Seabrook Station UFSAR for the Personnel Airlock, Equipment Hatch and Fuel Transfer Tube therefore TLAAs are considered.

Analysis

The design of the Seabrook Station containment penetrations was searched for evidence of cyclic evaluations. In each case, the design process was a comparison of design stresses to a stress limit independent of the number of load cycles and with no fatigue analysis. Comparison to other containment systems designed by United Engineers and Constructors (UE&C) resulted in similar design criteria.

UFSAR Section 3.8.2.3 lists the cyclic loads considered in the design of the personnel airlock and equipment hatch which include:

- 120 cycles of plant startup and shutdown
- 400 OBE cycles
- 100 SSE cycles
- 1 accident cycle (LOCA)
- 160 pressure test cycles

UFSAR section 3.8.2.3 lists the cyclic considered in the design of the fuel transfer tube assembly which include:

- 400 OBE cycles
- 1 accident cycle (LOCA)
- 160 pressure test cycles
- 1000 temperature cycles

The anticipated number of cycles for the Personnel Airlock, Equipment Hatch and Fuel Transfer Tube Assembly projected to occur during the period of extended operation is bounded by the original design.

Disposition

Personnel Airlock, Equipment Hatch and Fuel Transfer Tube

Validation, 10 CFR 54.21(c)(1)(i) – The analyses for the Personnel Airlock, Equipment Hatch and Fuel Transfer Tube remains valid for the period of extended operation as the anticipated number of cycles anticipated during the period of extended operation is bounded by the original design.

Containment Penetrations

Conclusion, Because the design of the containment penetrations did not involve cyclic analysis, and the plant will continue to operate within the design envelope in the period of extended operation, the analyses of the containment penetrations are not considered TLAAs.

4.7 PLANT-SPECIFIC TIME LIMITED AGING ANALYSES

4.7.1 ABSENCE OF A TLAA FOR REACTOR VESSEL UNDERCLAD CRACKING ANALYSES

Summary Description

Crack growth due to cyclic loading could occur in reactor vessel shell forgings clad with stainless steel by a high-heat-input welding process. Growth of intergranular separations (underclad cracks) in the heat-affected zone under austenitic stainless steel cladding is a TLAA to be evaluated for the period of extended operation for all SA-508 Class 2 forgings with cladding deposited by high-heat-input welding.

Growth of intergranular separations (underclad cracks) in the heat-affected zone under austenitic steel cladding is not an applicable aging effect. The supplementary criteria identified in Regulatory Guide 1.43 were implemented to give reasonable assurance that underclad cracking was avoided in production weld cladding. From Table 5.3-3 of UFSAR:

> Closure Head Flange, Vessel Flange, Inlet Nozzle and Outlet Nozzle – SA-508 Class 2 from UFSAR 5.3.1.2 Special Processes Used For Manufacturing and Fabrication:
>
> i. The procedure qualification for cladding low alloy steel (SA-508, Class 2) requires a special evaluation to assure freedom from underclad cracking.

Analysis

For the Seabrook Station reactor vessel, the cladding of the reactor vessel SA-508 Class 2 forgings did not use a high-heat-input welding process which could induce underclad cracking; therefore, the Seabrook Station reactor vessel is not susceptible to underclad cracking.

Conclusion

No TLAA is assigned for Reactor Vessel underclad cracking analyses at Seabrook Station. The application of cladding to the Reactor Vessel SA-508, Class 2 forgings is not susceptible to underclad cracking, because high-heat-input welding processes, which could induce underclad cracking, were not used.

4.7.2 REACTOR COOLANT PUMP FLYWHEEL FATIGUE CRACK GROWTH ANALYSES

Summary Description

Westinghouse Report WCAP-14535-A, Rev. 0, "*Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination*" includes a fatigue crack growth analysis that has been identified as a TLAA. The report was submitted for NRC review and the NRC issued a Safety Evaluation Report in September 1996. The purpose of the report was to provide an engineering basis for elimination of reactor coolant pump (RCP) flywheel inservice inspection requirements for all operating Westinghouse plants and certain Babcock and Wilcox plants. The number of cycles (pump starts and stops) used in this report was 6,000 for a 60-year plant life. Crack growth was shown to be negligible from exposure to these 6,000 cycles.

Analysis

The number of cycles (pump starts and stops) for a 60-year plant life was assumed to be 6,000 for this analysis. Crack growth was shown to be negligible from exposure to these 6,000 cycles. Table 4.4.2-1 provides the current and 60-year projected number of RCP start/stop cycles for Seabrook.

Table 4.4.2-1 Seabrook Station 60-Year Projected Reactor Coolant Pump Start/Stop Cycles

RCP Identification	Current Cycle Count (1)	60-Year Cycle Projection (2)
1A	152	536
1B	152	536
1C	152	536
1D	152	536

(1) Data obtained from Seabrook Station Cycle Counting records.

(2) Based on 18.6 years of operations (Refer to Section 4.3.1).

From Table 4.4.2-1, the projected number of RCP start/stop cycles for the Seabrook Station RCP flywheels are much less than the analyzed 6,000 cycles.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – Since the number of analyzed start/stop cycles exceeds the 60-year cycle projections, the reactor coolant pump flywheel analysis remains valid for the period of extended operation.

4.7.3 LEAK-BEFORE-BREAK ANALYSES

Summary Description

Title 10 Part 50 Appendix A, General Design "*Criteria for Nuclear Power Plants*" Criterion 4 of the Code of Federal Regulations allows for the use of leak-before-break (LBB) methodology for excluding the dynamic effects of postulated ruptures in reactor coolant system piping. The fundamental premise of the LBB methodology is that the materials used in nuclear power plant piping are sufficiently tough, that even a large through-wall crack would remain stable and would not result in a double-ended pipe rupture. Application of the LBB methodology is limited to those high-energy fluid systems not considered to be overly susceptible to failure from such mechanisms as corrosion, water hammer, fatigue, thermal aging or indirectly from such causes as missile damage or the failure of nearby components. The analyses involved with LBB are considered TLAAs.

Analysis

A LBB analysis was initially performed for Seabrook Station primary loop piping in 1984. To demonstrate the elimination of RCS primary loop pipe breaks, the following objectives had to be achieved:

- Demonstrate that margin exists between the "critical" crack size and a postulated crack that yields a detectable leak rate.
- Demonstrate that there is sufficient margin between the leakage through a postulated crack and the leak detection capability.
- Demonstrate margin on the applied load.
- Demonstrate that fatigue crack growth is negligible.

The initial analysis was reviewed to demonstrate compliance with LBB technology for Seabrook Station. Review of the 40-year LBB analysis considered input from the Stretch Power Uprate (2005) and the Mechanical Stress Improvement Process (MSIP) application at one of the reactor vessel primary hot leg nozzle locations (2009). Review for the period of extended operation was based on the same set of design transients as the original analyses; therefore the conclusions of the original evaluation remain valid for the 60-year period.

Plant specific geometry, operating parameters, loading, and material properties were used in the fracture mechanics evaluation. The mechanical properties were determined at operating temperatures. Since the piping systems also include cast austenitic stainless steel (CASS) piping components, fracture toughness considering thermal aging was determined for each affected component's heat of material for the fully aged condition.

Based on loading, pipe geometry, and fully aged fracture toughness considerations, enveloping governing locations were determined at which LBB crack stability evaluations were made. Through-wall flaw sizes were found which would cause a leak at a rate of ten (10) times the leakage detection system capability of the plant. Large margins for such flaw sizes were demonstrated against flaw instability. Finally, fatigue crack growth was shown not to be an issue for the reactor coolant system primary loop piping. The thermal transients used in the fatigue crack growth analysis were Seabrook Station design transients and projected cycles, which are reported in Table 4.3.1-3. The corresponding 60-year projected cycles, also shown in Table 4.3.1-3 are lower than the 40-year design values. Therefore, the numbers of design cycles assumed in the analysis bound the numbers of design cycles projected for 60 years of operation.

Disposition:

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation. The LBB review demonstrates that the previous LBB conclusions still remain valid, and the dynamic effects of the pipe rupture resulting from postulated breaks in the reactor coolant primary loop piping need not be considered in the Seabrook Station design basis for the period of extended operation.

4.7.4 HIGH ENERGY LINE BREAK POSTULATION BASED ON CUMULATIVE USAGE FACTOR

Summary Description

The Seabrook Station High Energy Line Break (HELB) analysis used a screening criterion of CUF greater than 0.1 to identify areas of investigation. The Seabrook Station Updated Final Safety Analysis Report (UFSAR) Section 3.6(B).2.1(a) provided a basis to eliminate locations in each piping run or branch run from further consideration as high energy line break locations on the basis of low fatigue usage, including intermediate locations where the cumulative usage factor was less than 0.1. These locations are considered TLAAs as the HELB analysis is based on a set of anticipated design transients and must be evaluated for the period of extended operation.

Selection of pipe failure locations for evaluation of the consequences on nearby essential systems, components, and structures, except for the reactor coolant loop, is in accordance with Regulatory Guide 1.46, and NRC Branch Technical Positions ASB 3-1 and MEB 3-1. A revised stress analysis also permitted omission of the surge line intermediate breaks. A leak-before-break

(LBB) analysis eliminated large breaks in the main reactor coolant loops. See Section 4.7.3.

Analysis

The citation of MEB 3-1 means that break locations in piping with ASME Section III Class 1 fatigue analyses are identified based on cumulative usage factor (with the stated exception of the reactor coolant system primary loops), and that these determinations are therefore TLAAs.

The surge line intermediate break locations were eliminated based on usage factor. The most recent piping analysis confirmed the elimination of these break locations. The analysis that justified the elimination of these intermediate locations in the surge line is therefore a TLAA.

The same would be true of other line sections with no intermediate locations with fatigue usage factors above 0.1, if this analysis result were used to eliminate intermediate breaks, that is, the determination that there are no intermediate breaks in these sections based on a low usage factor would, for the same reason, be a TLAA. However, no additional cases similar to the surge line occur in the Seabrook Station licensing basis.

The scope of these HELB location TLAAs is therefore limited to ASME Section III Class 1 piping connected to the RCS from the RCS primary coolant loops, to the ASME Class I/II piping interface. Since the 60 year projected cycles are bounded by the original design cycles, the present intermediate locations with CUF less than 0.1 remain valid for the period of extended operation.

Seabrook Station has containment penetration break exclusion regions. However, these break exclusion regions do not contain any ASME Section III Class 1 piping with fatigue analyses, and their qualification is therefore based only on calculated stress. The break locations in these no break zones are therefore independent of time and are not supported by a TLAA.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.7.5 FUEL TRANSFER TUBE BELLOWS DESIGN CYCLES

Summary Description

The fuel transfer tube assembly connects the fuel transfer canal (inside the containment structure) to the transfer pool (inside the spent fuel handling building). The fuel transfer tube assembly passes through the containment wall and through the exterior wall of the spent fuel handling building. The fuel transfer tube assembly is comprised of a 24-inch diameter penetration sleeve penetrating through the containment and spent fuel building walls and three (3) sets of expansion joints (bellows). The penetration sleeve and the three bellows perform a water-retaining intended function, and are within the scope of license renewal.

The fatigue analysis for each of the three bellows is based on the consideration of 20 occurrences of the Operating Basis Earthquake, each occurrence having 20 cycles of maximum response therefore, this design analysis is a TLAA requiring evaluation for the period of extended operation.

Analysis

In order to determine if the design analyses remain valid for 60 years of operation, the number of seismic cycles for 60 years has been projected. As of January 2010, the Seabrook transfer tube bellows will have been exposed to zero (0) Operating Basis Earthquake (OBE) cycles. It is projected that 1 OBE would occur for Seabrook in 60 years of operation. Therefore, since the number of cycles in 60 years is well below the 20 seismic movement cycles analyzed for these bellows, these design analyses remain valid for the period of extended operation.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.7.6 CRANE LOAD CYCLE LIMITS

4.7.6.1 POLAR GANTRY CRANE

Summary Description

The design specification for the 420/50-ton Polar Crane in the containment structure at Seabrook Station required that the crane conform to the design requirements of Crane Manufacturers Association of America (CMAA) Specification 70, "*Specifications for Electric Overhead Traveling Cranes*". Service requirements specified for the design of this crane correspond to the cyclic loading requirements of CMAA 70, Class A. This evaluation of cycles over the 40 year life is the basis of a safety determination and is, therefore, a TLAA.

The Polar Crane was designed for up to 100,000 load cycles per criteria of CMAA Specification 70 for service Class A. This service class covers cranes which may be used in installations such as power houses, public utilities, turbine rooms, motor rooms and transformer stations where precise handling of equipment at slow speeds with long, idle periods between lifts are required. Capacity loads may be handled for initial installation of equipment and for infrequent maintenance.

Analysis

The estimated number of lifts for the Polar Crane over the remaining 40 years of service (which includes 20 years of Extended Operation) is 19,440 with most of the lifts being less than 2500 pounds. This rate is based on refueling outage use, therefore, the first 20 years of service life for the Polar Crane would include approximately 10,000 load cycles. Thus, the total service life load cycles will be approximately 30,000. Since the total number of lifts is at the low end of the allowable design value of up to 100,000 cycles, the Polar Crane load cycle fatigue analyses for Seabrook Station remains valid for 60 years of plant operation.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.7.6.2 CASK HANDLING CRANE

Summary Description

The original Seabrook Station Cask Handling Crane was replaced in 2008 by a single failure-proof crane rated for 130 tons (main hoist) and 5 tons (each of two auxiliary hoists). To meet single failure criteria, each of these cranes was designed to the requirements of ASME NOG-1-2004, NUREG-0554, and NUREG-0612. The cranes were also designed to Crane Manufacturers Association of America (CMAA) Specification 70, "*Specifications for Electric Overhead Traveling Cranes*", with an allowable design life cycle range of up to 100,000 cycles. This evaluation of cycles over the projected 40-year life is the basis of a safety determination and has been identified as a TLAA requiring evaluation for the period of extended operation.

Analysis

Although the new crane became operational in 2008, the bridge structure is original equipment. The period of extended operation expires in 2050, resulting in 60 years of operation. The projected number of lifts for the Cask Handling Crane is less than 500. This estimate is based upon the expected number of casks that must be handled during each cask loading campaign and the projected number of campaigns through the period of extended operation. Allowing for double that number for minor lifts, or 1000 cycles, the estimated number of lifts for the Cask Handling Crane, 1500 cycles, is much less than the maximum allowable design value of 100,000 cycles, the Cask

Handling Crane load cycle fatigue analyses remain valid for 60 years of plant operation.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.7.7 SERVICE LEVEL I COATINGS QUALIFICATION

Summary Description

Service Level 1 coatings used at Seabrook Station are in compliance with the applicable ANSI standards for coating systems inside containment. In a design base accident, the Emergency Core Cooling System (ECCS) at Seabrook Station pumps water from inside the containment sump to the reactor vessel to keep the core covered with water and make up losses from the pipe break location. These coatings could potentially detach during a design basis accident and the coating debris could contribute to flow blockage of ECCS suction strainers. The ECCS has suction piping located below the waterline inside the sump. Since it is assumed that the degree of radiation exposure used in the original qualification testing was intended to bound 40 years of operation, qualification of Service Level 1 coatings is considered a TLAA.

Analyses

Industry operating history has shown that undesirable degradation, detachment, and other types of failures of coatings have occurred. Detached coatings from the substrate that are transported to Emergency Core Cooling System (ECCS) suction strainers could make those systems unable to satisfy the requirement in 10 CFR 50.46(b)(5) to provide long-term cooling.

Significant quantities of coated surfaces inside containment that would be exposed to the post Loss of Coolant Accident environment are listed in UFSAR Table 6.1(B)-2. The coating systems for these surfaces are epoxy-based Keeler & Long coating systems designed for a 40-year life and are in compliance with the applicable ANSI standards for coating systems inside containment. The qualification of the coatings to withstand the effects of radiation and the design basis accident conditions assures these coatings will remain in place and not contribute to clogging of ECCS strainers beyond analyzed limits.

The coatings used for Service Level 1 applications at Seabrook Station were qualified and applied in accordance with the requirements of the following documents:

- NRC Regulatory Guide 1.54, "*Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants*," June, 1973

- ANSI N101.4-1972, *"Quality Assurance for Protective Coatings Applied to Nuclear Facilities"*

- ANSI N101.2 – 1972, *"Protective Coatings (Paints) for Light Water Nuclear Containment Facilities"*

- ANSI N512-1974, *"Protective Coatings (Paints) for the Nuclear Industry"*

The maintenance rule, 10 CFR 50.65, "*Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*," includes in its scope safety-related SSCs that are relied upon to remain functional during and following design basis events with respect to specified functions and non-safety-related SSCs

(1) That are relied upon to mitigate accidents or transients or are used in plant emergency operating procedures,

(2) Whose failure could prevent safety-related SSCs from fulfilling their safety-related function, and

(3) Whose failure could cause a reactor scram or an actuation of a safety-related system.

To the extent that protective coatings meet these criteria, they are within the scope of the maintenance rule. The maintenance rule requires that Seabrook Station monitor the effectiveness of maintenance for protective coatings within its scope (as discrete systems or components or as part of any SSC), or demonstrate that their performance or condition is being effectively controlled through the performance of appropriate preventive maintenance, in accordance with 10 CFR 50.65(a)(1) or (a)(2), as appropriate.

Disposition

Aging Management - 10 CFR 54.21(c)(1)(iii) - Seabrook Station Service Level I Coatings are managed by the ASME Section XI, Inservice Inspection, Subsection IWE Program, B.2.1.27 and Procedure for Application of Service Level I Coatings. Seabrook Station periodically conducts condition assessments of Service Level I coatings inside containment. Coating inspections are performed at the beginning and at the end of each refueling outage. Inspections at the beginning of the refueling outage are performed by a NextEra Energy Coating Supervisor and a Design Engineer for peeling coatings that have the potential of falling into the reactor or Containment Building Spray recirculation sumps.

At the end of the refueling outage, the NextEra Energy Coating Supervisor notifies the design engineer and Nuclear Coating Specialist to perform the Containment Closeout Inspection. The inspection assesses the condition of the Containment coating. The inspection includes accessible coated areas of the Containment and equipment including, but not limited to, the following items: concrete and steel surfaces, liner plate wall to concrete floor joint, liner plate wall penetrations, personnel and equipment hatches, and personnel air locks. As localized areas of degraded coatings are identified, those areas are evaluated and scheduled for repair or replacement, as necessary. The periodic condition assessments, and the resulting repair/replacement activities, assure that the amount of Service Level 1 coatings which may be susceptible to detachment from the substrate during a LOCA event is minimized.

4.7.8 ABSENCE OF A TLAA FOR REACTOR COOLANT PUMP: CODE CASE N-481

Summary Description

ASME Boiler and Pressure Vessel Code, Section XI, specifies that a volumetric inspection of the reactor coolant pump casing welds and a visual inspection of pump casing internal surfaces be performed on a reactor coolant pump within each 10-year inspection period. These 10-year volumetric inspections are significant because the reactor coolant pumps have already been welded to the piping and the pumps must be disassembled in order to gain access to the inside surface of the cast stainless steel casings. In recognition of these difficulties, ASME Code Case N-481, "*Alternative Examination Requirements for Cast Austenitic Pump Casings*", was developed to allow for the replacement of volumetric examinations with fracture mechanics, based evaluation and supplemented by specific visual inspections.

Analyses

The Seabrook Station UFSAR Section 5.4.1.4 *"Tests and Inspections"* states, "The reactor coolant pumps can be inspected in accordance with the ASME Code, Section XI, for in-service inspection of nuclear reactor coolant systems." The Seabrook Station pump casings are cast in one piece, eliminating welds in the casing. In addition, support feet are cast integral with the casing to eliminate a weld region.

Conclusion

The Seabrook Station Reactor Coolant Pump (RCP) casings are single castings, which contain no welds. Therefore, Code Case N-481, "*Alternative Examination Requirements for Cast Austenitic Pump Casings*", is not applicable to Seabrook Station RCP.

4.7.9 CANOPY SEAL CLAMP ASSEMBLIES

Summary Description

The canopy seal clamp assemblies were designed for a 40 year design life on the basis of meeting stress limits. The original fatigue analysis considered the forces that would be applied to the center head adapter which maximized the moments on the J-Grove weld and moment along the length of the adapter. The fatigue analysis for the Canopy Seal Clamps is based on the consideration of 400 cycles consisting of 20 occurrences of the Operating Basis Earthquake, each occurrence having 20 cycles of maximum response. This design analysis is a TLAA requiring evaluation for the period of extended operation.

Analysis

In order to determine if the design analyses remain valid for 60 years of operation, the number of seismic cycles for 60 years has been projected. As of January 2010, the Seabrook Station Canopy Seal Clamps have been exposed to zero (0) Operating Basis Earthquake (OBE) cycles. It is projected that 1 OBE would occur for Seabrook Station in 60 years of operation. Therefore, since the number of cycles in 60 years is well below the 20 seismic movement cycles analyzed for these clamps, these design analyses remain valid for the period of extended operation.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation. The canopy seal clamp assemblies are projected to continue to operate within the same stress limits in the extended operating period and will remain acceptable for the period of extended operation.

4.7.10 HYDROGEN ANALYZER

Summary Description

The Seabrook Station Hydrogen Analyzer was evaluated with respect to radiation exposure. The UFSAR contains accumulated radiation dose limits for a 40 year operating period. The Hydrogen Analyzer is a safety related component. The analysis of the effects of radiation considered the annual accumulated dosage, and projected these values, to demonstrate that the maximum dose limits specified in the UFSAR will not be exceeded in a 60 year operating period.

Analysis

The post accident Hydrogen Analyzer must perform a safety function following a Loss of Coolant Accident (LOCA). Excessive radiation exposure could jeopardize the ability to perform this safety function. The Seabrook Station UFSAR Table 6.2-84 defines the Hydrogen Analyzer design parameters and maximum radiation dose limits for forty years of normal operation.

The operational dose for 40 years is 5×10^6 rads.

The projected maximum 40 year exposure comes from three sources; the gas in the analyzers themselves, the gas in the piping in the room, and the shine from the containment atmosphere through the penetrations into the room.

The predicted one year total integrated dose for the Seabrook Station Hydrogen Analyzer is comprised as follows:

From the analyzers,	5.8×10^6 mrads
From the piping,	0.2×10^6 mrads
From the penetrations,	1.2×10^6 mrads
Total	7.2×10^6 mrads = 7.2×10^3 rads

Thus, the maximum predicted dose for a 60 year plant operating period is 60-years x 7.2×10^3 rads/year. = 4.32×10^5 rads. This is an order of magnitude less than the specified UFSAR radiation dose limit. Therefore, the Seabrook Station Hydrogen Analyzer is shown to be acceptable for the period of extended operation.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analysis remains valid for the period of extended operation.

4.7.11 MECHANICAL EQUIPMENT QUALIFICATION

Summary Description

The Seabrook Station CLB commits to the review and evaluation of the environmental qualification of mechanical equipment to demonstrate compliance with General Design Criteria 4 of Appendix A to 10 CFR Part 50.

Results of this evaluation demonstrate safety-related active mechanical equipment located in harsh environments had been adequately addressed.

Since a period of 40 years was used to determine the normal service radiation exposure to the equipment, mechanical equipment qualification (MEQ) is considered a TLAA.

Analysis

The design basis event conditions during the period of extended operation will remain the same as those in the current license period, which have been adjusted to account for previously approved power uprate conditions. Therefore, the design basis event parameters, including the temperature, pressure, and time profiles, do not require further evaluation as TLAAs for license renewal.

Disposition

Revision, 10 CFR 54.21(c)(1)(ii) – The effects of aging on the intended function(s) of equipment included under Mechanical Equipment Qualification will be adequately addressed for the period of extended operation. Calculations for Mechanical Equipment Qualification will be revised prior to entering the period of extended operation. Revision of MEQ calculations will be accomplished using techniques currently used under the CLB for equipment qualification including analytical methods, replacement of radiation sensitive materials or equipment replacement.

4.7.12 ABSENCE OF A TLAA FOR METAL CORROSION ALLOWANCES AND CORROSION EFFECTS

Summary Description

Nuclear plant components are commonly designed with corrosion allowances, and TLAAs of corrosion effects for the 40-year design life.

Analysis

A review of the Seabrook Station licensing basis found no description of time-dependent corrosion allowances, rates, or corrosion-dependent design lives of pressure vessels, system components, piping, or metal containment components.

Conclusion

There are no TLAAs for metal corrosion allowances and corrosion effects.

4.7.13 ABSENCE OF A TLAA FOR INSERVICE FLAW GROWTH ANALYSES THAT DEMONSTRATE STRUCTURAL STABILITY FOR 40 YEARS

Summary Description

Defects discovered by inservice inspection or component failures may be repaired or replaced to restore the basis of the original design analysis; may be repaired or replaced to a different configuration, or may be analyzed to confirm that the as-found condition is acceptable. For ASME components these activities are controlled by Section XI, *"Rules for Inservice Inspection of Nuclear Power Plant Components."* A flaw analysis of a Class 1 component usually requires a fatigue crack growth analysis, which is a TLAA if it qualifies the component for the plant design life.

Analysis

A thorough review of the Seabrook Station licensing basis, supported by interviews with plant staff familiar with the history of Class 1 components, found the following fatigue crack growth analyses:

- Fatigue crack growth and fracture mechanics stability analyses in support of pressurizer nozzle overlays. The overlays were supported by fatigue crack growth analyses. These fatigue crack growth analyses were projected to the end of the period of extended operation, and are therefore not TLAAs. See Section 4.3.6.

- Fatigue crack growth assessments and fracture mechanics stability analyses in support of the leak-before-break (LBB) evaluation. Review for the period of extended operation was based on the same set of design transients as the 40-year analyses; therefore the conclusions of the original evaluation remain valid for the 60-year period and are therefore not TLAAs. See Section 4.7.3.

- Fatigue crack growth and fracture mechanics stability analyses of Mechanical Stress Improvement Process (MSIP) repairs to Alloy 600 material in reactor coolant hot legs. The MSIP repair was supported by fatigue crack growth analysis. This fatigue crack growth analysis was projected to the end of the period of extended operation, and is therefore not a TLAA. See Section 4.3.6.

Conclusion

These fatigue crack growth analyses are not TLAAs because they qualify the affected components for the period of extended operation.

4.7.14 DIESEL GENERATOR THERMAL CYCLE EVALUATION

Summary Description

The Emergency Diesel Generators were designed for a 40 year design life on the basis of 5454 Total Equivalent Full Temperature Cycles.

Analysis

The Emergency Diesel Generators provide Emergency Power to Buses 5 and 6. The Emergency Diesel Generators were analyzed for thermal cycling by the engine manufacturer for Environmental Qualification in accordance with IEEE 323. The manufacturer qualified the Diesel Generator for 5454 Full Temperature Cycles for the forty year design life of the plant. This would amount to starting the Diesel once per week since installation to the end of the period for extended operation. Under current plant operating practices, the Emergency Diesel Generators are operated only occasionally during periodic surveillance and maintenance testing. Monthly testing over 60 years would contribute 720 cycles assuming an equal number of starts for maintenance and actual events an additional 1440 cycles could occur. These actual and potential cycles combined equal slightly more than 2000 cycles for the Emergency Diesel Generators. It is, therefore, unlikely that the 5454 assumed cycles will be approached during the period of extended operation. Thus, the existing analysis is considered to remain valid for the period of extended operation, and there is reasonable assurance that the intended function will be maintained.

Disposition

Validation, 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.8 GENERAL REFERENCES

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4-2. NUREG-1800, Revision 1, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants,” September 2005.

4-3. USNRC Regulatory Guide 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence,” March 2001.

4-4. USNRC Regulatory Guide 1.99, Revision 2, “”Radiation Embrittlement of Reactor Materials,” May 1988.

4-5. 10 CFR 50.49, Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants, U. S. Nuclear Regulatory Commission.

4-6. USNRC Regulatory Guide 1.89, Rev. 1, 6/84, Environmental Qualification of Certain Electrical Equipment Important to Safety for Nuclear Power Plants,

4-7. USNRC Regulatory Guide 1.97, Rev. 0, 3/76, Instrumentation of Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident.

4-8. USNRC Generic Safety Issue-190, Fatigue Evaluation of Metal Components for 60-Year Plant Life.

4-9. 10 CFR 50.60, Acceptance Criteria for Fracture Prevention Measures for Light Water Nuclear Power Reactors for Normal Operation, Code of Federal Regulations, U. S. Nuclear Regulatory Commission.

4-10. Appendix G, 10 CFR 50, Fracture Toughness Requirements, Code of Federal Regulations, U. S. Nuclear Regulatory Commission.

4-11. Appendix H, 10 CFR 50, Reactor Vessel Material Surveillance Requirements, Code of Federal Regulations, U. S. Nuclear Regulatory Commission.

4-12. Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, ASME Boiler and Vessel Pressure Code, American Society of Mechanical Engineers, July 1986.

4-13. 10 CFR 50.61, “Fracture toughness requirements for protection against pressurized thermal shock events, U. S. Nuclear Regulatory Commission.

4-14. USNRC Inspection and Enforcement Bulletin 88-08, “Thermal Stresses in Piping Connected to Reactor Cooling Systems,” June 1988.

4-15. USNRC Inspection and Enforcement Bulletin 88-11, “Pressurizer Surge Line Thermal Stratification,” December 1988.

4-16. NUREG/CR-6260, “Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components,” March 1995.

4-17. NUREG/CR-5704, “Effects of LWR Coolant Environments of Fatigue Design Curves of Austenitic Stainless Steels.”

4-18. NUREG/CR-6583, “Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels.”

4-19. NUREG-0554, “Single-Failure-Proof Cranes for Nuclear Power Plants”, May 1979

4-20. NUREG-0612, “Control of Heavy Loads at Nuclear Power Plants”, July 1980

4-21. ANSI N45.2, 1971, "Quality Assurance Program Requirements for Nuclear Power Plants,"

4-22. USNRC Regulatory Guide 1.54, Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants, June, 1973

4-23. ANSI N101.4-1972, Quality Assurance for Protective Coatings Applied to Nuclear Facilities

4-24. ANSI N101.2 – 1972, Protective Coatings (Paints) for Light Water Nuclear Containment Facilities

4-25. ANSI N512-1974, Protective Coatings (Paints) for the Nuclear Industry

4-26. WCAP-14535A, “Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination,” November 1996.

4-27. Technical Specifications NextEra Energy Seabrook, LLC, Et Al.* Docket No. 50-443 Seabrook Station, Unit No. 1.

4-28. Seabrook Station Updated Final Safety Analysis Report, Revision 13

4-29. Westinghouse. Report WCAP-14535-A, Rev. 0, “Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination

4-30. Westinghouse. Report WCAP-10567, “Technical Bases for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for Seabrook Units 1 and 2,” June 1984.

4-31. Westinghouse. Report WCAP 14040-NP-A Rev 2 “ Methodology used to Develop Cold Overpressure Mitigating system Setpoints and RCS Heatup and Cooldown Limit Curves” January 1996

4-32. Westinghouse. Report WCAP 15745, Seabrook Unit 1 Heatup and Cooldown Limit Curves for Normal Operation, December 2001

4-33. Standard Review Plan; Public Comment Solicited; 3.6.3 Leak-Before-Break Evaluation Procedures; Federal Register/Vol. 52, No. 167/Friday, August 28, 1987/Notices, pp. 32626-32633.

4-34. Crane Manufacturers Association of America (CMAA) Specification 70. Specifications for Electric Overhead Traveling Cranes, 2004

4-35. North Atlantic Energy Service Company T. C. Feigenbaum (NAESC) to the USNRC Document Control Desk, : Revision to Limiting Reactor Vessel Beltline Material January 18, 1999

USNRC, “Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment,” Generic Letter 98-04, July 14, 1998.2

4-36. Subsection IWE, “Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Plants,” IWE-1000.

APPENDIX A

UPDATED FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

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A.1 INTRODUCTION

The application for a renewed operating license is required by 10 CFR 54.21(d) to include a Updated Final Safety Analysis Report (UFSAR) Supplement. This appendix, which includes the following sections, comprises the UFSAR supplement:

Section A.1.1	contains a listing of the aging management programs that correspond to NUREG-1801 Chapter XI programs.
Section A.1.2	contains a listing of the plant-specific aging management programs.
Section A.1.3	contains a listing of aging management programs that correspond to NUREG-1801 Chapter X programs associated with Time- Limited Aging Analyses.
Section A.1.4	contains a listing of the Time-Limited Aging Analyses (TLAA).
Section A.1.5	contains a discussion of the Quality Assurance Program and Administrative Controls.
Section A.2.1	contains a summarized description of the NUREG-1801 Chapter XI programs for managing the effects of aging.
Section A.2.2	contains a summarized description of the plant-specific programs for managing the effects of aging.
Section A.2.3	contains a summarized description of the NUREG-1801 Chapter X programs that support the TLAAs.
Section A.2.4	contains a summarized description of the TLAAs applicable to the period of extended operation.
Section A.3	contains the License Renewal Commitment List.

The integrated plant assessment for license renewal identified new and existing aging management programs necessary to provide reasonable assurance that system, structures, and components (SSC) 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.

A.1.1 NUREG-1801 CHAPTER XI AGING MANAGEMENT PROGRAMS

The following list of aging management programs correspond to NUREG-1801 Chapter XI programs.

1. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (A.2.1.1)
2. Water Chemistry (A.2.1.2)
3. Reactor Head Closure Studs (A.2.1.3)
4. Boric Acid Corrosion (A.2.1.4)
5. Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (A.2.1.5)
6. (Not Used)
7. PWR Vessel Internals (A.2.1.7)
8. Flow-Accelerated Corrosion (A.2.1.8)
9. Bolting Integrity (A.2.1.9)
10. Steam Generator Tube Integrity (A.2.1.10)
11. Open-Cycle Cooling Water System (A.2.1.11)
12. Closed-Cycle Cooling Water System (A.2.1.12)
13. Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (A.2.1.13)
14. Compressed Air Monitoring (A.2.1.14)
15. Fire Protection (A.2.1.15)
16. Fire Water System (A.2.1.16)
17. Aboveground Steel Tanks (A.2.1.17)
18. Fuel Oil Chemistry (A.2.1.18)
19. Reactor Vessel Surveillance (A.2.1.19)
20. One-Time Inspection (A.2.1.20)
21. Selective Leaching of Materials (A.2.1.21)
22. Buried Piping and Tanks Inspection (A.2.1.22)
23. One-Time Inspection of ASME Code Class 1 Small Bore-Piping (A.2.1.23)
24. External Surfaces Monitoring (A.2.1.24)
25. Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (A.2.1.25)

26. Lubricating Oil Analysis (A.2.1.26)
27. ASME Section XI, Subsection IWE (A.2.1.27)
28. ASME Section XI, Subsection IWL (A.2.1.28)
29. ASME Section XI, Subsection IWF (A.2.1.29)
30. 10 CFR 50, Appendix J (A.2.1.30)
31. Structures Monitoring Program (A.2.1.31)
32. Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements (A.2.1.32)
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34. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements (A.2.1.34)
35. Metal Enclosed Bus (A.2.1.35)
36. Fuse Holders (A.2.1.36)
37. Electrical Cable Connections Not Subject to 10 CFR 50.49 EQ Requirements (A.2.1.37)

A.1.2 PLANT SPECIFIC AGING MANAGEMENT PROGRAMS

The plant-specific aging management programs are listed below.

1. 345 KV SF_6 Bus (A.2.2.1)
2. Boral Monitoring (A.2.2.2)
3. Nickel Alloy Nozzles and Penetrations (A.2.2.3.)

A.1.3 NUREG-1801 CHAPTER X AGING MANAGEMENT PROGRAMS

The following list of aging management programs correspond to NUREG-1801 Chapter X programs associated with Time-Limited Aging Analysis .

1. Metal Fatigue of Reactor Coolant Pressure Boundary (A.2.3.1)]
2. Environmental Qualification (EQ) of Electrical Components (A.2.3.2)]

A.1.4 TIME-LIMITED AGING ANALYSIS SUMMARIES

Summaries of the Time-Limiting Aging Analyses applicable for the period of extended operation are listed below.

1. Neutron Embrittlement of the Reactor Vessel (A.2.4.1)
2. Metal Fatigue of Vessels and Piping (A.2.4.2)
3. Environmental Qualification (EQ) of Electrical Equipment (A.2.4.3)
4. Fatigue of the Containment Liner and Penetrations. (A.2.4.4)
5. Other Plant-Specific TLAAs (A.2.4.5)

A.1.5 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

The Quality Assurance Program implements the requirements of 10 CFR 50, Appendix B, and is consistent with the summary in Appendix A.2, "*Quality Assurance For Aging Management Programs (Branch Technical Position IQMB-1)*" of NUREG-1800 "*Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants"*. The Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls, and these elements are applicable to the safety-related and non-safety related systems, structures, and components (SSC) that are subject to Aging Management Review (AMR).

A.2 AGING MANAGEMENT PROGRAMS

A.2.2.1 NUREG-1801 CHAPTER XI AGING MANAGEMENT PROGRAMS

A.2.1.1 ASME SECTION XI INSERVICE INSPECTION, SUBSECTIONS IWB, IWC, AND IWD

American Society of Mechanical Engineer (ASME) Section XI, Subsections IWB, IWC, IWD Inservice Inspection Program facilitates inspections to identify and correct degradation in Class 1, 2, and 3 piping, components, and integral attachments. The program includes periodic visual, surface and/or volumetric examinations of all Class 1, 2 and 3 pressure-retaining components, their supports and integral attachments (including welds, pump casings, valve bodies and pressure-retaining bolting) and leakage tests of pressure retaining components.

The program is implemented in accordance with the requirements of 10 CFR 50.55a, with specified limitations, modifications and NRC-approved alternatives.

A.2.1.2 WATER CHEMISTRY

The Water Chemistry Program includes periodic monitoring and control of detrimental contaminants below the levels known to cause cracking, loss of material, or reduction of heat transfer. The primary scope of this program consists of the Reactor Coolant system and related auxiliary systems containing treated water, reactor coolant, treated borated water and steam. The program is based on Electric Power Research Institute (EPRI) PWR primary water chemistry guidelines and Pressurized Water Reactor (PWR) secondary water chemistry guidelines.

A.2.1.3 REACTOR HEAD CLOSURE STUDS

The Reactor Head Closure Studs Program conducts inspections of reactor vessel flange stud hole threads, reactor head closure studs, nuts, and washers to manage cracking and loss of material per the requirements of ASME, Boiler and Pressure Vessel Code, Section XI, "*Rules for Inservice Inspection of Nuclear Power Plant Components.*"

A.2.1.4 BORIC ACID CORROSION

The Boric Acid Corrosion Program implements the recommendations of Nuclear Regulatory Commission (NRC) Generic Letter 88-05 "*Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants*," and manages aging of structures and components resulting from borated water leakage. The program requires periodic visual inspection of all systems within the scope of license renewal that contain borated water for evidence of leakage, accumulations of dried boric acid, or boric acid damage. The program provides for visual inspections and early discovery of borated water leaks such that mechanical, electrical, and structural components that may be contacted by leaking borated water will not be adversely affected or their intended functions impaired. The program identifies components exhibiting boric acid accumulations or leakage, evaluates the acceptability for continued service of components exhibiting boric acid accumulations or leakage, trends and tracks previously identified leaks or boric acid accumulations and provides corrective actions for the observed leakage sources and any other affected structures and components.

A.2.1.5 NICKEL-ALLOY PENETRATION NOZZLES WELDED TO THE UPPER REACTOR VESSEL CLOSURE HEADS OF PRESSSURIZED WATER

The Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program manages the aging effect of cracking due to primary water stress corrosion cracking of the nickel-alloy used in the fabrication of the upper vessel head penetration nozzles. The NRC has approved ASME Code Case N-729-1, *"Examination Requirements for PWR Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds, Section XI, Division"* with conditions in accordance with the requirements of 10 CFR 50.55a (g)(6)(ii)(D). Repair, replacement, and mitigation activities are conducted in accordance with the Seabrook Station ASME Section XI Repair/Replacement program.

A.2.1.6 (NOT USED)

A.2.1.7 PWR VESSEL INTERNALS

The PWR Vessel internals Program manages aging effects in reactor vessel internals components. It is based on the EPRI-MRP-227, "*Pressurized Water Reactor Internals Inspection and Evaluation Guidelines*" and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program.

The aging management approach for PWR vessel internals consists of four major elements:

(1) component categorization and aging management strategy development;

(2) selection of aging management methodologies for PWR vessel internals that are both appropriate and based on an adequate level of applicable experience;

(3) qualification of the recommended methodologies that is based on adequate technical justification; and

(4) implementation of the recommendations based on the Industry Initiative for the Management of Materials Issues, NEI 03-08 "*Guideline for the Management of Materials Issues*".

A.2.1.8 FLOW-ACCELERATED CORROSION

The Flow-Accelerated Corrosion (FAC) Program manages aging effects of loss of material due to wall thinning on the internal surfaces of carbon or low alloy steel piping, elbows, reducers, tees, expanders, and valve bodies containing high energy fluids (both single phase and two phase flow). The program is based on the EPRI guidelines in NSAC-202L, "*Recommendations for an Effective Flow Accelerated Corrosion Program*" and uses the Chexal Horowitz Engineering/ Corrosion Workstation (CHECWORKS) software program as a predictive tool. Included in the FAC program are:

(a) an analysis to determine FAC susceptible lines,

(b) performance of baseline inspections,

(c) follow-up inspections to confirm the predictions

(d) repairing or replacing components, as necessary.

A.2.1.9 BOLTING INTEGRITY

The Bolting Integrity Program manages the aging effects associated with bolting through the performance of periodic inspections for indications of cracking and loss of material and loss of preload. The program also includes repair/replacement controls for ASME Section XI related bolting and generic guidance regarding material selection, thread lubrication and assembly of bolted joints. The program follows the guidelines and recommendations delineated in NUREG-1339,"*Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants*," EPRI NP-5769," *Degradation and Failure of Bolting in Nuclear Power Plants," and* EPRI TR-104213*," Bolted Joint Maintenance & Application Guide*" for comprehensive bolting maintenance.

The Bolting Integrity Program credits other aging management programs for the inspection of bolting. Operator rounds and system walkdowns will also identify joint leakage.

The Bolting Integrity Program credits six separate aging management programs for the inspection of bolting.

1. ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD provides the requirements for inservice inspection of ASME Class 1, 2, and 3 piping, which includes pressure retaining bolting.
2. ASME Section XI, Subsection IWE Program, includes steel containment shells and their integral attachments.
3. ASME Section XI, Subsection IWF Program, provides the requirements for inservice inspection of ASME Class 1, 2, and 3 component supports.
4. Buried Piping and Tanks Program, provides the requirements for the periodic visual inspections of corrosion on buried piping and tanks, including bolting.

5. External Surfaces Monitoring Program provides the requirements for the inspection of bolting for steel components such as piping, piping components, ducting and other components within the scope of license renewal.
6. Structures Monitoring Program provides the requirements for the inspection of structural support bolting.

A.2.1.10 STEAM GENERATOR TUBE INTEGRITY

The Steam Generator Tube Integrity Program manages the aging effects of cracking, loss of material, reduction of heat transfer and wall thinning from flow accelerated corrosion of the Steam Generator components. The program is based on NEI 97-06 Rev. 2, *"Steam Generator Program Guidelines",* the response and commitment to Generic Letter 97-06, *"Steam Generator Program Guidelines"*, and Seabrook Station Technical Specification 3/4.4.5 *"Steam Generators"* which ensure that the performance criteria for structural integrity, accident-induced leakage, and operational leakage are not exceeded. Seabrook Station has implemented the operational leakage limits found in NUREG-1431, *"Standard Technical Specifications for Westinghouse Pressurized Water Reactors"*.

A.2.1.11 OPEN-CYCLE COOLING WATER SYSTEM

The Open-Cycle Cooling Water System Program manages the aging effects of hardening and loss of strength, loss of material, and reduction of heat transfer. This program relies on the implementation of the recommendations of NRC Generic Letter 89-13,"*Service Water System Problems Affecting Safety-Related Equipment*". The program manages aging effects for components in the circulating water, primary component cooling water, service water, and diesel generator systems.

A.2.1.12 CLOSED-CYCLE COOLING WATER SYSTEM

The Closed-Cycle Cooling Water Program manages aging effects of cracking, loss of material and reduction of heat transfer in closed cycle cooling water systems. Closed-Cycle Cooling Water (CCCW) systems are described as systems not subject to significant sources of contamination, in which water chemistry is controlled and in which heat is not directly rejected to the ultimate heat sink. The program scope includes activities to manage aging in the Primary Component Cooling Water system and Emergency Diesel Generator Jacket Water cooling systems. The program also includes fire pump diesel engine glycol coolant system, the Control Building Air Handling glycol coolant system (safety-related), and the Thermal Barrier Cooling Water system.

The program includes maintenance of system corrosion inhibitor concentrations to minimize degradation and inspections of opportunity to assess management of component aging. The program is based on the EPRI "*Closed Cycle Cooling Water Chemistry Guidelines*".

A.2.1.13 INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD (RELATED TO REFUELING) HANDLING SYSTEMS

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program manages loss of material of structural components and wear on the rails of lifting systems within the scope of license renewal.

The program employs the use of visual inspections to identify aging effects prior to loss of function. Preventive actions are not associated with these activities.

Only the structural portions of the in-scope cranes and monorails are in the scope of this program.

A.2.1.14 COMPRESSED AIR MONITORING

The Compressed Air Monitoring Program manages aging effects of hardening and loss of strength, loss of material, and reduction of heat transfer and assures an oil free, dry air environment in the plant compressed air system, Diesel Generator compressed air subsystem and containment compressed air system components.

Seabrook Station committed to maintain instrument air quality in accordance with the Quality Standard for Instrument Air, ISA-S7.3; *"Quality Standard for Instrument Air".* Compliance with ISA-S7.3 is verified by continuous monitoring or periodic testing. In-line dew point monitors are used to verify that the dew point of instrument air at the outlet of the instrument air system dryers is at or below a calculated limit. In-line filters are installed which limit air system maximum entrained particle size. These in-line filters meet or exceed the requirements of the quality standard. Periodic replacement of filters is part of the preventative maintenance program for instrument air systems. Air samples are obtained at least annually and tested for to ensure compliance with air quality standards.

A.2.1.15 FIRE PROTECTION

The Fire Protection Program manages aging effects to the fire protection and suppression components through detailed inspections. Age-related degradation of the diesel-driven fire pump's fuel oil supply line is managed through regularly scheduled fire pump performance tests.

The Fire Protection Program includes but is not limited to inspections of fire barrier penetration seals, fire barrier walls, ceilings, floors, fire doors and testing to prove functionality of the diesel driven fire pump fuel oil supply line.

A.2.1.16 FIRE WATER SYSTEM

The Fire Water System Program manages the aging effects of loss of material and reduction of heat transfer due to fouling of the Fire Water System components through detailed inspections via the Seabrook Station Surveillance Test Procedures.

The Fire Water System Program is established in accordance with the applicable National Fire Protection Association (NFPA) codes and standards.

The chemistry program provides methods and directions for adding various chemicals to various plant systems including the Fire Water Tanks. These chemicals prevent microbiological growth, inhibit scale formation, dispense solids contained in water, improve chlorination efficiency and maintain pH level to prevent corrosion of piping and components.

A.2.1.17 ABOVEGROUND STEEL TANKS

The Aboveground Steel Tanks Program manages aging effects through preventive measures to mitigate corrosion and through periodic inspections to manage any effects of corrosion on aboveground steel tanks within the scope of License Renewal.

The program utilizes the application of protective coatings on the exterior surfaces of the in-scope steel tanks to mitigate corrosion development due to environmental factors. To ensure that the exterior surfaces of the tanks remain protected, the protective coatings are visually inspected.

Inaccessible locations, such as the tank bottom, will be surveyed by ultrasonic thickness measurements from inside the tank to detect any material degradation. The ultrasonic thickness measurements of fuel oil tanks within the scope of this program will be performed in accordance with the Fuel Oil Chemistry Program.

A.2.1.18 FUEL OIL CHEMISTRY

The Fuel Oil Chemistry Program manages loss of material in the diesel fuel oil systems for the emergency diesel generators, diesel driven fire water pumps and the Auxiliary Boiler fuel oil system through monitoring and maintenance of diesel fuel oil quality.

New fuel oil is sampled and verified to meet the requirements of applicable American Society for Testing and Materials (ASTM) standards prior to offloading to the storage tanks. The program monitors fuel oil quality and the levels of water in the fuel oil which may cause the loss of material of the tank internal surfaces. The program monitors water and sediment contamination in diesel fuel.

Fuel Oil storage tanks are periodically drained and inspected. This inspection includes ultrasonic thickness measurements of the tank bottom surface to ensure that significant degradation has not occurred.

A.2.1.19 REACTOR VESSEL SURVEILLANCE

The Reactor Vessel Surveillance Program manages the aging effect of loss of fracture toughness due to neutron embrittlement of the low alloy steel Reactor Vessel. The extent of reactor vessel embrittlement for upper-shelf energy and pressure temperature limits for 60 years is projected in accordance with the

NRC Regulatory Guide 1.99, "*Radiation Embrittlement of Reactor Vessel Materials*". The program utilizes the methodology of projecting neutron embrittlement using surveillance data. Monitoring methods are in accordance with 10 CFR 50, Appendix H "*Reactor Vessel Material Surveillance Requirements*". Testing methods are in accordance with ASTM E 185-82 "*Radiation Embrittlement of Reactor Vessel Materials*".

A.2.1.20 ONE-TIME INSPECTION

The One-Time Inspection Program addresses potentially long incubation periods for certain aging effects and provides a means of verifying that an aging effect is either not occurring or is progressing so slowly as to have negligible effect on the intended function of the structure or components. The One-Time Inspection Program provides measures for verifying that an aging management program is not needed, for verifying the effectiveness of an existing program, or for determining that degradation is occurring which will require evaluation and corrective action.

The One-Time Inspection Program includes determination of appropriate inspection sample size, identification of inspection locations, selection of examination technique, specification of acceptance criteria, and evaluation of results to determine the need for additional inspections or other corrective actions. The inspection sample includes locations where the most severe aging effect(s) would be expected to occur. Inspection methods may include visual (or remote visual), surface or volumetric examinations, or other established NDE techniques.

This Program:

- Verifies the effectiveness of the Plant Chemistry Program for managing the effects of aging in portions of piping and components exposed to a treated water environment.
- Verifies the effectiveness of the Fuel Oil Chemistry Program for managing the effects of aging of piping and components in systems that contain fuel oil.
- Verifies the effectiveness of the Lubricating Oil Analysis Program for managing the effects of aging of piping and components in systems that contain lube oil.

A.2.1.21 SELECTIVE LEACHING OF MATERIALS

The Selective Leaching of Materials Program manages the aging effects of loss of material in components susceptible to selective leaching that are exposed to raw water, brackish water, treated water (including closed cycle cooling), or groundwater environment.

The Selective Leaching of Materials Program will include a one-time examination of selected components that may be susceptible to selective leaching. Visual inspection and mechanical examination techniques (Brinell hardness testing or other mechanical examination techniques such as destructive testing (when appropriate), scraping, chipping or other types of hardness testing), or additional examination methods that become available to the nuclear industry, will be used to determine if selective leaching is occurring on the surfaces of a selected set of components.

A.2.1.22 BURIED PIPING AND TANKS INSPECTION

The Buried Piping and Tanks Inspection Program manages loss of material from the external surfaces of buried steel (including cast iron) and stainless steel components. The plant has no buried steel tanks in scope for license renewal. The program includes preventive measures to mitigate corrosion and periodic inspections that manage the aging effects of corrosion on the pressure-retaining capacity of buried piping in the scope for license renewal.

The program includes provisions for visual inspections of the protective wraps and coatings on buried steel and stainless steel piping when the pipes are exposed during maintenance. If damage to the protective wraps or coatings is found, the outer surface of the pipe is inspected for loss of material due to general, pitting, crevice or microbiologically-influenced corrosion.

This program requires that at least one opportunistic or focused inspection be performed within the ten year period prior to entering the period of extended operation. Upon entering the period of extended operation a planned inspection will be performed within ten years, unless an opportunistic inspection has occurred within that ten year period.

A.2.1.23 ONE-TIME INSPECTION OF ASME CODE CLASS 1 SMALL BORE-PIPING

The One-Time Inspection of ASME Code Class 1 Small Bore Piping Program applies to small-bore ASME Code Class 1 piping less than 4 inches nominal pipe size (NPS), including pipe, fittings, and branch connections. While the ASME Boiler and Pressure Vessel Code, Section XI, *“Rules for Inservice Inspection of Nuclear Power Plant Components”,* does not require volumetric examination of Class 1 small-bore piping, the Seabrook Station One-Time Inspection of ASME Code Class 1 Small Bore Piping Program will be used to identify cracking by performing volumetric examinations of selected piping.

The inspection sample determination will include both socket welds and butt welds. If non-destructive volumetric inspection techniques have not been qualified, Seabrook will have the option to remove the weld for destructive examination.

A.2.1.24 EXTERNAL SURFACES MONITORING

The External Surfaces Monitoring Program manages aging effects through visual inspection of external surfaces for evidence of hardening and loss of strength, reduction of heat transfer and loss of material (galvanic, general, crevice and pitting corrosion, and wear). This program consists of periodic inspections of aluminum, Cast Austenitic Stainless Steel (CASS), copper alloy, copper alloy >15% zinc, elastomer, galvanized steel, gray cast iron, nickel alloy, stainless steel and steel components such as piping, piping components, ducting, pipe supports and other components to manage aging effects.

The External Surfaces Monitoring Program utilizes periodic plant system inspections and walkdowns to monitor for materials degradation and leakage. This program inspects components such as piping, piping components, ducting and other components, including bolting. Coatings deterioration is monitored as an indication of possible underlying degradation.

A.2.1.25 INSPECTION OF INTERNAL SURFACES IN MISCELLANEOUS PIPING AND DUCTING COMPONENTS

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program manages the aging effects of cracking, loss of material, fouling, reduction of heat transfer and hardening and loss of strength. This program consists of inspections of the internal surfaces of aluminum, CASS, copper alloy, copper alloy >15% zinc, elastomer, galvanized steel, gray cast iron, nickel alloy, stainless steel, and steel piping, piping components, ducting and other components that are not covered by other aging management programs.

The program inspections are inspections of opportunity, performed during pre-planned periodic system and component surveillances or during maintenance activities when the systems are opened and the surfaces made accessible for visual inspection. This maintenance may occur during power operations or refueling outages when many systems are opened. The visual inspections assure that existing environmental conditions are not causing material degradation that could result in a loss of the component intended function.

A.2.1.26 LUBRICATING OIL ANALYSIS

The Lubricating Oil Analysis Program obtains and analyzes lubricating oil samples from plant equipment to ensure that the oil quality is maintained within established limits. The program provides an early indication of adverse equipment condition in lubricating oil environments.

The Seabrook Station Lubricating Oil Analysis Program includes sampling and analysis of lubricating oil for components within the scope of license renewal and subject to aging management review, that are exposed to lubricating oil and for which pressure boundary integrity or heat transfer is required for the component to perform its intended function.

A.2.1.27 ASME SECTION XI, SUBSECTION IWE

The ASME Section XI, Subsection IWE Program manages aging effects to the containment liner, electrical penetrations, mechanical penetrations (piping, ventilation, and spares), personnel lock, equipment hatch, recirculation sump, reactor pit, moisture barriers, seals, gaskets, and supports.

The program performs inspections using the same primary Inservice Inspection method as specified in ASME Section XI, Subsection IWE "*Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Power Plants* "; visual examination (general visual, VT-3, VT-1).

A.2.1.28 ASME SECTION XI, SUBSECTION IWL

The ASME Section XI, Subsection IWL, Inservice Inspection Program manages aging effects to the steel reinforced concrete for the containment building and complies with the requirement of examination requirements of 10 CFR 50.55a in accordance with ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWL "*Requirements for Class CC Concrete Components of Light-Water Cooled Power Plants*".

The primary inspection methods used are VT-1C visual examination, VT-3C visual examination and alternative examination methods (in accordance with IWA-2240). All accessible containment reinforced concrete components are within the scope of this program.

A.2.1.29 ASME SECTION XI, SUBSECTION IWF

The ASME Section XI, Subsection IWF "*Requirements for Class 1,2,3, and MC Component Supports of Light-Water Cooled Power Plants*," Inservice Inspection Program (ISI) provides inspections of Class 1, 2, and 3 Component Supports. For supports other than piping supports, the supports of only one component of a group having similar design, function, and service must be examined. Supports of piping and other items exempted from volumetric or surface examination are also exempt.

The program uses VT-3 visual examination for detection of degradation. The performance requirements for VT-3 examination are conducted to determine the general mechanical and structural condition of components and their supports.

A.2.1.30 10 CFR 50, APPENDIX J

The 10 CFR Part 50, Appendix J Program implements Title 10 Code of Federal Regulations Part 50 Appendix J, "*Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors*" Option B. The test requirements of Appendix J provide for periodic verification by tests of the leak-tight integrity of the primary reactor containment. The purposes of the tests are to assure that 1) leakage through the containment or systems and components penetrating the containment does not exceed the allowable leakage rate specified in the Technical Specifications and Updated Final Safety Analysis Report, and 2) integrity of the containment structure is maintained during its service life.

A.2.1.31 STRUCTURES MONITORING PROGRAM

The Structures Monitoring Program includes the Masonry Wall Program and the Inspection of Water Control Structures Associated with Nuclear Power Plants Program.

The Structures Monitoring Program is implemented through the plant Maintenance Rule Program, which is based on the guidance provided in NRC Regulatory Guide 1.160 "*Monitoring the Effectiveness of Maintenance at Nuclear power Plants*" and NUMARC 93-01 "*Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*". The Structures Monitoring Program was developed using the guidance of these two documents. The Program is implemented to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function.

A.2.1.32 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 EQ REQUIREMENTS

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program manages the aging of accessible non-EQ cables and connections. Accessible cables and connections located in adverse localized environments shall be visually inspected for indications of accelerated insulation aging such as embrittlement, discoloration, cracking, swelling, or surface contamination. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable or connection. Accessible cables and connections shall be inspected prior to entering the period of extended operation, and at least once every 10 years thereafter.

A.2.1.33 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 EQ REQUIREMENTS USED IN INSTRUMENTATION CIRCUITS

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program manages the aging of in-scope cables and connections. The program applies to sensitive instrumentation cable and connection circuits with low-level signals that are in scope for license renewal and are located in areas where the cables and connections could be exposed to adverse localized environments caused by heat, radiation, or moisture. These adverse localized environments can result in reduced insulation resistance causing increases in leakage currents.

The program shall perform insulation resistance tests on the in-core neutron flux monitoring cable and connections in the Nuclear Instrumentation System.

The frequency of the tests on these cables shall be based on engineering evaluation, but the test frequency shall be at least once every ten years. The first test shall be performed prior to entering the period of extended operation.

A.2.1.34 INACCESSIBLE MEDIUM VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 EQ REQUIREMENTS

The Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program manages the aging of inaccessible medium voltage cables exposed to adverse localized environments caused by significant moisture while energized.

The program includes the following two components:

- **Periodic Inspections Of Manholes Containing In-Scope Medium Voltage Cables**

  In-scope manholes shall be periodically inspected for water collection. Water found in the manholes shall be drained.

  The frequency of manhole inspections shall be adjusted based on inspection results. However, the maximum time between inspections shall be no more than two years. The first inspections shall be performed prior to entering the period of extended operation.

- **Testing Of In-Scope Inaccessible Medium Voltage Cables**

  The specific type of test performed shall be determined prior to the initial test, and shall be a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, as described in EPRI guidelines for "*Effects of Moisture on the Life of Power Plant Cables*" or other testing that is state-of-the-art at the time the test is performed. Cable testing shall be performed prior to entering the period of extended operation and at least once every 10 years thereafter.

A.2.1.35 METAL ENCLOSED BUS

The Metal Enclosed Bus Program manages the aging of in-scope metal enclosed buses. The internal portions of the in-scope metal enclosed bus enclosures are inspected for cracks, corrosion, foreign debris, excessive dust buildup and evidence of moisture intrusion. The bus insulation is visually inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. The internal bus supports are visually inspected for structural integrity and signs of cracks. Accessible bolted bus connections are checked for looseness using thermography from outside the metal enclosed bus.

The inspections and tests shall be performed prior to entering the period of extended operation and at least once every 10 years thereafter.

Aging management of the Metal Enclosed Bus enclosures and elastomers is included in the Structures Monitoring Program.

A.2.1.36 FUSE HOLDERS

The Fuse Holders Program manages the aging of in-scope metallic clamps of fuse holders.

The Fuse Holders Program performs tests on in-scope fuse holders (metallic clamps). The type of test is a proven test, such as thermography or contact resistance which detects thermal fatigue in the form of high resistance caused by corrosion or oxidation. The type of test performed is determined prior to the initial test. The first test shall be performed prior to entering the period of extended operation and at least once every 10 years thereafter.

A.2.1.37 ELECTRICAL CABLE CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 EQ REQUIREMENTS

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a one-time testing program that shall be used to verify the absence of aging effects on the metallic portion of electrical cable connections. The aging effect and mechanism of concern is the loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation.

The scope of this sampling program considers application (medium and low voltage), circuit loading (high loading), and location (high temperature, high humidity, vibration, etc).

The specific type of test performed is a proven test for detecting loose connections, such as thermography or contact resistance measurement, as appropriate for the application.

The one-time test shall be performed prior to entering the period of extended operation.

A.2.2 PLANT-SPECIFIC AGING MANAGEMENT PROGRAMS

A.2.2.1 345 kV SF_6 BUS

The 345kV SF_6 Bus Program manages the aging that could lead to loss of pressure boundary due to elastomer degradation, loss of material due to corrosion and loss of function due to unacceptable air, moisture or SO_2 levels. Sulfur Hexafluoride (SF_6) is an inert gas which is used to insulate the bus conductor.

The program inspects for corrosion on the exterior of the bus duct housing, tests for leaks and tests gas samples to determine air, moisture and SO_2 levels.

The presence of air or moisture may lead to the loss of intended function. SO_2 levels are an indication of partial discharge internal to the bus.

The tests and inspections shall be performed prior to entering the period of extended of operation and at least once every six months thereafter.

A.2.2.2 BORAL MONITORING

The Boral Monitoring Program assures the Boral neutron absorbers in the spent fuel racks maintain the validity of the criticality analysis in support of the rack design. The program relies on representative coupon samples mounted in a coupon “train” located in the spent fuel pool to monitor performance of the absorber material without disrupting the integrity of the storage system. Coupon samples are removed from the spent fuel pool on a prescribed schedule and physical, chemical and neutronic absorptive properties are measured. From these data, the physical condition and neutron-absorbing capacity of the Boral in the storage cells are assessed.

A.2.2.3 NICKEL-ALLOY NOZZLES AND PENETRATIONS

The Nickel-Alloy Nozzles and Penetrations Program manages the aging effect of cracking due to primary water stress corrosion cracking (PWSCC) of nickel-alloy pressure boundary and structural components exposed to primary coolant.

The Nickel-Alloy Nozzles and Penetrations Program ranked the Alloy 600/82/182 locations based on four main criteria: PWSCC susceptibility (e.g., operational time and temperature), failure consequence, leakage detection margin, and radiation dose rates. Additionally, material heat susceptibility and other industry experience were considered.

The program incorporates the inspection schedules and frequencies for the nickel-alloy components in accordance with the plant ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and, where applicable, ASME Code Case N-722 “*Additional Examinations for PWR [pressurized water reactor (PWR)] Pressure Retaining Welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials, Section XI, Division 1*," subject to the conditions specified in 10 CFR 50.55a(g)(6)(ii)(E).

The program complies with applicable NRC Orders, and implements applicable NRC Bulletins, Generic Letters, and staff-accepted industry guidelines.

A.2.3 NUREG-1801 CHAPTER X AGING MANAGEMENT PROGRAMS

A.2.3.1 METAL FATIGUE OF REACTOR COOLANT PRESSURE BOUNDARY

The Metal Fatigue of Reactor Pressure Boundary Program is a preventive program that monitors and tracks the number of critical thermal and pressure transients to verify that the Cumulative Usage Fatigue (CUF) for reactor coolant system components remain less than 1.0 through the period of extended operation. The program determines the number of transients that occur and updates 60-year projections on a periodic basis.

The program is credited with monitoring reactor coolant system design transients. Cumulative Usage Fatigue of the Reactor Vessel, the pressurizer, the Steam Generators, Class 1 and non-Class 1 piping, and Class 1 components subject to the reactor coolant, treated borated water, and treated water environments. The program will use fatigue monitoring software to monitor the number of cycles a system or components endure. Pre-established limits will identify components approaching design limits. Components approaching design limits will be reanalyzed, repaired, replaced or inspected in accordance with applicable design codes.

A.2.3.2 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC COMPONENTS

The Environmental Qualification (EQ) of Electric Components Program provides a summary of the components that are managed for EQ aging. The 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. 10 CFR 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. 10 CFR 50.49(e)(5) 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. 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"*. Seabrook Station conforms to NUREG-0588 Category 1 requirements.

Seabrook Station's compliance with 10 CFR 50.49 ensures that the component can perform its intended functions during accident conditions after experiencing the effects of in-service aging. The 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 EQ Program that specify a qualification of at least 40 years are TLAAs for license renewal because the criteria contained in 10 CFR 54.3 are met.

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 disposition option 10 CFR 54.2(c)(1)(iii), which states that the effects of aging will be adequately managed for the period of extended operation, is chosen and the EQ Program will manage the aging effects of the components**.**

A.2.4 TIME-LIMITED AGING ANALYSES

A.2.4.1 NEUTRON EMBRITTLEMENT OF THE REACTOR VESSEL

The current license period reactor vessel embrittlement analyses that evaluate reduction of fracture toughness of the Seabrook Station reactor vessel beltline materials are based on a 40-year End-of-Life (EOL) fluence values. The analyses associated with neutron embrittlement of reactor vessel materials due to neutron irradiation are Time-Limited Aging Analyses (TLAAs) as defined by 10 CFR 54.21(c) and must be evaluated for the increased neutron fluence associated with 60 years of operation.

The following Seabrook Station analyses are TLAAs that address the effects of neutron irradiation on the reactor vessel.

- Neutron Fluence
- Upper-Shelf Energy (USE)
- Pressurized Thermal Shock
- Pressure-Temperature (P-T) Limits

A.2.4.1.1 Neutron Fluence Analyses

The neutron fluence analysis is a TLAA as defined by 10 CFR 54.21(c) and must be evaluated for the increased neutron fluence associated with 60 years of operation. These neutron fluence projections are used as input to the analyses for fracture toughness, or Upper Shelf Energy (USE), Pressurized Thermal Shock (PTS) limits, Reverence Temperatures – Nil Ductility Transition (RT_{NDT}), Adjusted Reference Temperatures (ART), Low-Temperature Overpressure Protection (LTOP) limits, and Reactor Vessel Pressure-Temperature Limit (P-T limit) curves.

A.2.4.1.2 Upper Shelf Analyses

The current Charpy Upper Shelf Energy (USE) analyses were prepared for the reactor vessel beltline materials for Seabrook Station based upon projected neutron fluence values for 40 years of service. These are TLAAs requiring evaluation using the projected 60-year fluence values.

The Seabrook Station analyses have been projected to the end of the period of extended operation for reactor vessel materials with projected fluence exceeding 1×10^{17} n/cm^2 (MeV > 1.0). The USE values for the beltline and extended beltline materials are projected to remain above the 50 ft-lb requirement through the period of extended operation for Seabrook Station in accordance with 10 CFR 54.21(c)(1)(ii).

A.2.4.1.3 Pressurized Thermal Shock

10 CFR 50.61(b)(1) provides rules for the protection of pressurized water reactors against pressurized thermal shock. Licensees are required to assess the projected values of nil-ductility reference temperature whenever a significant change occurs in the projected values of Reference Temperature – Pressurized Thermal Shock (RT_{PTS}), or upon request for a change in the expiration date for the facility operating license. The current RT_{PTS} analyses, evaluated for 32 Effective Full Power Years (EFPY) fluence values predicted for 40 years of operation, are TLAAs requiring evaluation for 60 years.

The margin is the difference between the maximum nil-ductility reference temperature (RT_{PTS}) in the limiting beltline material and the screening criteria established in accordance with 10 CFR 50.61(b)(2). The screening criteria for the limiting reactor vessel materials are 270°F for beltline plates, forgings, and axial weld materials, and 300^{o}F for beltline circumferential weld materials. If the calculated value reference temperature is less than the specified screening criterion, then the vessel is acceptable with respect to reactor vessel during postulated transients during the period of extended operation.

The RT_{PTS} analyses have been projected to the end of the period of extended operation and are shown to be within the maximum allowable PTS screening criteria limits in accordance with 10 CFR 54.21(c)(1)(ii).

A.2.4.1.4 Reactor Vessel Pressure-Temperature Limits, Including Low Temperature Overpressure Protection Limits

Title 10 CFR Part 50, Appendix G requires that the reactor pressure vessel be maintained within established pressure-temperature (P-T) limits, including heatup and cooldown operations. The P-T limits must account for the anticipated reactor vessel fluence. The current minimum Low Temperature Overpressure Protection (LTOP) setpoint for Seabrook Station is 561 psig.

The current Seabrook Station P-T and LTOP limit calculations are effective through 20 EFPY. Heatup and cooldown P-T limit curves for 55 EFPY will be prepared using the most limiting value of RT_{NDT} (reference nil ductility transition temperature) corresponding to the limiting material in the beltline region of the reactor vessel. This is determined by using the unirradiated reactor vessel material fracture toughness properties adjusted to account for the estimated irradiation-induced shift in the Reference Temperature – Nil Ductility Transition (ΔRT_{NDT}).

The P-T and LTOP limit analyses will not be submitted at this time. The effects of aging on the intended function(s) will be adequately managed for the period of extended operation in accordance with 10 CFR 54(c)(1)(iii). Seabrook Station will submit updates to the P-T curves and LTOP limits to the NRC at the appropriate time to comply with 10 CFR 50 Appendix G.

A.2.4.2 METAL FATIGUE OF VESSELS AND PIPING

Metal fatigue was evaluated in the design process for Seabrook Station pressure boundary components, including the reactor vessel, reactor coolant pumps, steam generators, pressurizer, piping, valves, and components of primary, secondary, auxiliary, steam, and other systems. The current design analyses for these components have been determined to be Time-Limited Aging Analyses (TLAAs) requiring evaluation for the period of extended operation. This section is divided into seven subsections that each addresses a specific grouping of components that were analyzed in accordance with the same design requirements.

These groupings are as follows:

- Nuclear Steam Supply System (NSSS) Pressure Vessel and Component Fatigue Analyses
- Supplementary ASME Section III, Class 1 Piping and Component Fatigue Analyses
- Reactor Vessel Internals Fatigue Analyses
- Environmentally-Assisted Fatigue Analyses
- Steam Generator Tube, Loss of Material and Fatigue Usage from Flow-induced Vibration
- Absence of TLAAs For Fatigue Crack Growth, Fracture Mechanics Stability, or Corrosion Analyses Supporting Repair of Alloy 600 Materials
- Non-class I Component Failure Analysis

A.2.4.2.1 Nuclear Steam Supply System (NSSS) Pressure Vessel and Component Fatigue Analyses

Nuclear Steam Supply System (NSSS) pressure vessels and components for Seabrook were designed in accordance with ASME Section III, Class 1 requirements and were required to have explicit analyses of cumulative usage fatigue. The major components are the Reactor Vessel, Vessel Closure Head, Steam Generators and the Reactor Coolant Pump Casings. The applicable design codes for these components have been identified.

In order to determine if the ASME Section III, Class 1 fatigue analyses will remain valid for 60 years of service, a review of fatigue monitoring data was performed to determine the number of cumulative cycles of each transient type that have occurred during past plant operations. Then the average rate of occurrence was determined, and predictions of future transient occurrences were made. For each transient type, the 60-year projected number of occurrences was determined by adding the number of past occurrences to the number of predicted future occurrences. These 60-year projections were then compared to the numbers of design cycles used in the fatigue analyses to determine if the design cycles remain bounding for 60 years of operations. If the 60-year projected numbers of cycles is less than the numbers of cycles used in the design fatigue analyses, then the fatigue analyses based upon the design transients will remain valid for 60 years of operation if the design transient severity is also bounding of the actual transient severity.

The 40-year design transients bound the numbers of cycles projected to occur during 60 years of plant operations at Seabrook. Therefore, the NSSS Class 1 fatigue analyses that are based upon the 40-year design transients remain valid for the period of extended operation.

A.2.4.2.2 Supplementary ASME Section III, Class 1 Piping and Component Fatigue Analyses

In addition to the original design assumptions, the Seabrook Pressurizer fatigue evaluations were updated to include the added thermal stratification effects of insurge and outsurge events on the pressurizer lower head and surge nozzle.

Each of the Seabrook Station piping systems, including the Reactor Coolant System main loop piping, were originally designed in accordance with ASME Section III 1971 Edition with addenda through Winter 1972 . Since then, a number of updated fatigue analyses have been prepared for piping systems and components to address transients that have been identified in the industry that were not originally considered. These analyses have been performed in accordance with ASME Section III, Class 1 rules to enable these transients to be thoroughly evaluated. These transients included thermal stratification of the pressurizer surge line, as described in NRC Bulletin 88-11.

These analyses are separated from those evaluated in the previous sections because the transient definitions have been modified, or additional transients have been postulated for these components, in addition to those previously described. Therefore, the cycle projections for these components must address these revised transients or additional transient types to determine if they also remain bounded for 60 years of service.

A.2.4.2.2.1 NRC Bulletin 88-11, Pressurizer Surge Line Thermal Stratification

NRC Bulletin 88-11, issued in December 1988, requested utilities to establish and implement a program to confirm the integrity of the pressurizer surge line. The program required both visual inspection of the surge line and demonstration that the design requirements of the surge line are satisfied, including the consideration of stratification effects.

The Pressurizer Surge Line piping and nozzles were previously evaluated for the effects of thermal stratification and plant-specific transients (1990) and determined that the surge line will remain within the ASME Code requirements for the design life of the unit. The controlling fatigue location was the surge line hot leg nozzle safe-end. In later evaluations, plant-specific ASME Section III, Class 1 evaluations were performed for the surge line hot leg nozzle and pressurizer surge nozzle.

The hot leg surge line nozzle was evaluated for the effects of pressurizer insurge and outsurge transients and surge line stratification. Projected 60-year cycles of surge line stratification and insurge and outsurge transients were used when these were greater than previously evaluated design cycles. These evaluations resulted in CUF less than 1.0 at the hot let surge line nozzle.

The pressurizer surge nozzle was evaluated for the effects of pressurizer insurge and outsurge transients and surge line stratification. The pressurizer surge nozzle has been evaluated using an ASME Section III, Class 1 fatigue analysis. This analysis was part of the evaluation of the structural weld overlay applied to the pressurizer surge nozzle. This evaluation resulted in a Cumulative Usage Factor (CUF) less than 1.0 at the pressurizer surge nozzle.

The analyses remain valid for the period of extended operation for the Pressurizer Surge Line, Pressurizer Surge Nozzle and Surge Line Hot Leg Nozzle in accordance with 10 CFR 54.21(c)(1)(i).

A.2.4.2.2.2 Reactor Vessel Internals Aging Management

The Seabrook Reactor Vessel Internals were designed and constructed prior to the development of ASME Code requirements for core support structures. Demonstration that the effects of aging degradation are adequately managed is essential for assuring continued functionality of the reactor internals during the desired plant operating period, including license renewal. The EPRI Materials Reliability Program (MRP) Reactor Internals Inspection & Evaluation (I&E) Guidelines (MRP-227) inspection requirements will manage aging effects.

In accordance with 10 CFR 54.21(c), the Aging Management Program for reactor vessel internals will provide assurance that the effects of aging will be adequately managed for the period of extended operation per 10 CFR 54.21(c)(1)(iii).

A.2.4.2.3 Environmentally-Assisted Fatigue Analyses

NUREG-1801, Revision 1, “*Generic Aging Lessons Learned*”, contains recommendations on specific areas for which existing programs should be augmented for license renewal. The program description for Aging Management Program X.M1, Metal Fatigue of Reactor Coolant Pressure Boundary Program, provides guidance for addressing environmental fatigue for license renewal. It states that an acceptable program addresses the effects of the reactor coolant environment on component fatigue life by assessing the impact of the reactor coolant environment on a sample of critical components for the plant. Examples of these components are identified in NUREG/CR-6260, “*Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components*”.

This sample of components can be evaluated by applying environmental life correction factors to the existing ASME Code fatigue analyses using formulae contained in NUREG/CR-6583, *“Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low Alloy Steels”* and in NUREG/CR-

5704*, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels*". Demonstrating that these components have an environmentally adjusted cumulative usage factor less than or equal to the design limit of 1.0 is an acceptable option for managing metal fatigue for the reactor coolant pressure boundary.

NUREG/CR-6260 provided environmental fatigue calculations for a newer vintage Westinghouse plant using the interim fatigue curves from NUREG/CR-5999 for the locations of highest design CUF for the components listed below:

1. Reactor Vessel Shell and Lower Head
2. Reactor Vessel Inlet and Outlet Nozzles
3. Pressurizer Surge Line
4. Charging Nozzle
5. Safety Injection Nozzle
6. Residual Heat Removal System Class 1 Piping

For the NUREG/CR-6260 locations identified above, the plant-specific components were identified and the design ASME fatigue usage factors were adjusted by the environmentally-assisted fatigue penalty factors (F_{en}) to obtain the environmentally-assisted fatigue (EAF) result.

All locations were shown to achieve air-curve cumulative usage factors less than 1.0 for the 60 years of service. The evaluation of environmental fatigue effects for the Reactor Vessel Shell and Lower Head and Reactor Vessel Inlet and Outlet Nozzles determined that the CUF will remain below the ASME code allowable fatigue limit of 1.0 using the maximum applicable Fen, applied to CUF based on the design number of transients for these locations, when extended to 60 years. The remainder of these locations, Reactor Coolant System (RCS) Pressurizer Surge Line Nozzle, RCS Charging Nozzle, RCS Safety Injection Nozzle, and RCS Residual Heat Removal System Class 1 Piping, were analyzed in accordance with ASME Code Section III, Subarticle NB-3200 using all six stress components. The evaluations show that EAFs exceed 1.0 for 60-years of service for the hot leg surge line nozzle and charging nozzle. These analyses were based on Seabrook Station specific conditions and these locations will be monitored for fatigue usage including environmental effects by the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1. Specifically, this program will monitor critical transients to verify cycle limits are maintained below limits specified in the UFSAR. Pre-established action limits will permit completion of corrective actions before the design basis number of events is exceeded, and before the cumulative usage factor, including environmental effects, exceeds the AMSE Code limit of 1.0. At least 2 years prior to entering the period of extended operation, Seabrook Station will implement the following aging management program for the plant-specific locations listed in NUREG/CR-6260 for the newer vintage Westinghouse plants.

(1) Consistent with the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1 Seabrook Station will update the fatigue usage calculations using refined fatigue analyses, if necessary, to determine acceptable CUFs (i.e., less than 1.0) when accounting for the effects of the reactor water environment. This includes applying the appropriate F_{en} factors to valid CUFs determined from an existing fatigue analysis valid for the period of extended operation or from an analysis using an NRC-approved version of the ASME code or NRC-approved alternative (e.g., NRC-approved code case). Formulas for calculating the environmental life correction factors for carbon and low alloy steels are contained in NUREG/CR-6583 and those for austenitic stainless steels are contained in NUREG/CR-5704. NUREG/CR-6909 includes alternate formulas for calculating environmental life correction factors, in addition to updated fatigue design curves.

(2) If acceptable CUFs cannot be demonstrated for all the selected locations, then additional plant-specific locations will be evaluated. For the additional plant-specific locations, if CUF, including environmental effects is greater than 1.0, then Corrective Actions will be initiated, in accordance with the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1. Corrective Actions will include inspection, repair, or replacement of the affected locations before exceeding a CUF of 1.0 or the effects of fatigue will be managed by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method accepted by the NRC).

Therefore, the effects of the reactor coolant environment on fatigue usage factors in the remaining locations will be managed for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

A.2.4.2.4. Steam Generator Tube, Loss of Material and Fatigue Usage from Flow-Induced Vibration

The Seabrook Station Model F steam generators were evaluated with respect to flow induced vibration (tube wear and fatigue usage) for the power increases that were implemented as part of the Seabrook Station Power Uprates. The analysis of the effects of steam generator flow-induced vibration on tube wear and fatigue usage assumed 40 years of operation.

Low-cycle fatigue usage for the most limiting tube in the most limiting power-uprated operating condition resulting from the flow-induced vibration tube bending stress is 0.2 ksi. This value is well below the fatigue endurance limit of 20 ksi at 1E+11 cycles, resulting in a computed fatigue usage of 0.0. High-cycle fatigue usage of U-bend tubes was evaluated. One of the prerequisites for high-cycle U-bend fatigue is a dented support condition at the upper plate. Seabrook Station steam generator tube support plates are manufactured from stainless steel therefore there is no potential for the necessary conditions to occur. It was concluded that the support condition leading to a dented support condition necessary for high-cycle fatigue cannot occur in the Seabrook Station Model F steam generators.

A.2.4.2.5 Non-Class 1 Component Fatigue Analyses

This section describes fatigue-related TLAAs arising within design analyses of the Non-Class 1 piping and components. These piping and tubing components can be designed in accordance with ASME Section III Class 2 and 3.

The following non-Class 1 Seabrook Station systems that are in scope for license renewal were designed in accordance with ASME Section III Class 2 and 3, requirements: Reactor Coolant System (including primary loop piping and pressurizer surge line piping), Chemical and Volume Control System, Safety Injection System, Primary Component Cooling Water, Service Water, Sample System, Residual Heat Removal System, Main Steam System, Main Condensate and Feedwater, and the Steam Generator Blowdown System.

In order to evaluate these TLAAs for 60 years, the number of cycles expected to occur within the 60-year operational period should be compared to the numbers of cycles that were originally considered in the design of these components. If this number does not exceed 7,000 cycles, the minimum number of cycles required that would result in reduction of the allowable stress range, then there is no impact from the added years of service and the original analyses remain valid. If the total number of cycles exceeds 7,000 cycles, then additional evaluation is required.

The 60-year transient projection results for Seabrook show that even if all of the projected operational transients are added together, the total number of cycles projected for 60 years will not exceed 7,000 cycles. Therefore, there is no impact upon the implicit fatigue analyses used in the component design for the systems designed to ASME Section III Class 2 and 3, requirements.

The Sample System thermal cycles do not trend along with operational cycles because sampling is required on a periodic basis, as opposed to an operational basis. However, only the portion of the sampling lines that constitutes piping need be considered here. In this case that portion turns out to be a very short section of piping directly connected to the Reactor Coolant System (RCS) loop piping. Since this section of piping has no isolation valve and no bends, it is assumed to always be exposed to primary loop temperature and pressure condition. Similarly since there are no other external piping connections (only the tubing connection exits), the line will not experience any other externally applied loads. Therefore, that section of the sampling line that constitutes ASME Section III Class 2 and will only experience the RCS loop transients which have already been shown to be less than 7,000 cycles and the line is, therefore, acceptable.

The analyses remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.2.4.3 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC COMPONENTS

In accordance with 10CFR50.49, all electrical equipment important to safety located in a harsh environment and required to function in that environment must be environmentally qualified. In order for a component to have sufficient design margin to perform its important to safety function under harsh environment conditions, the component may need to be periodically rebuilt or replaced. For these EQ components, the EQ program insures that they are rebuilt, replaced or reevaluated at the necessary interval. All qualified lives within the scope of the EQ program are managed under the EQ Program.

The Seabrook Station Environmental Qualification (EQ) of Electric Components Program implements aging management activities which are credited for the management of aging in selected components within the scope of 10 CFR 54.

A.2.4.4 FATIGUE OF THE CONTAINMENT LINER AND PENETRATIONS

The original design analysis for the Seabrook Station containment liner plate determined that all of the criteria specified in ASME Section III Article NE-3221.5(d) required for exemption from the requirement to perform a cyclic operation analysis were met. To address these 40-year cycles during the period of extended operation, a re-evaluation of the six fatigue exemption requirements utilizing anticipated 60-year stress cycles was performed. The result of this analysis determined that the specified conditions through the period of extended operation continue to satisfy the requirement for exemption from analysis for cyclic operation in accordance with in ASME Section III Article NE-3221.5(d). The analysis has been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.2.4.5 OTHER PLANT-SPECIFIC TLAAS

A.2.4.5.1 Reactor Coolant Pump Flywheel Fatigue Crack Growth Analyses

Westinghouse Report WCAP-14535-A, Rev. 0, "*Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination*" includes a fatigue crack growth analysis that has been identified as a TLAA. The report was submitted for NRC review and the NRC issued a Safety Evaluation Report in September 1996. The purpose of the report was to provide an engineering basis for elimination of reactor coolant pump (RCP) flywheel inservice inspection requirements for all operating Westinghouse plants and certain Babcock and Wilcox plants. The number of cycles (pump starts and stops) used in this report was 6,000 for a 60-year plant life. Crack growth was shown to be negligible from exposure to these 6,000 cycles.

Based on the current cycle count projected to 60 years, the projected cycle count is much less than the analyzed cycle counts of 6,000 cycles. The reactor coolant pump flywheel analysis remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.2.4.5.2 Leak-Before-Break Analyses

Title 10 Code of Federal Regulations Part 50 Appendix A, Criterion 4 allows for the use of leak-before-break (LBB) methodology for excluding the dynamic effects of postulated ruptures in reactor coolant system piping. The fundamental premise of the LBB methodology is that the materials used in nuclear power plant piping are sufficiently tough that even a large through-wall crack would remain stable and would not result in a double-ended pipe rupture. Application of the LBB methodology is limited to those high-energy fluid systems not considered to be overly susceptible to failure from such mechanisms as corrosion, water hammer, fatigue, thermal aging or indirectly from such causes as missile damage or the failure of nearby components. The analyses involved with LBB are considered TLAAs.

Based on loading, pipe geometry, and fracture toughness considerations, enveloping governing locations were determined at which LBB crack stability evaluations were made. Through-wall flaw sizes were found which would cause a leak at a rate of ten (10) times the leakage detection system capability of the plant. Large margins for such flaw sizes were demonstrated against flaw instability. Finally, fatigue crack growth was shown not to be an issue for the reactor coolant system primary loop piping. The thermal transients used in the fatigue crack growth analysis were the design transients listed in the NSSS Design Limits for 40 years at Seabrook Station. The corresponding 60-year projected cycles are lower than the 40-year design values. Therefore, the numbers of design cycles assumed in the analysis bound the numbers of design cycles projected for the period of extended operation.

The analyses remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.2.4.5.3 High Energy Line Break Postulation Based on Cumulative Usage Factor

The Seabrook Station High Energy Line Break (HELB) analysis used a screening criterion of CUF greater than 0.1 to identify areas of investigation. The Seabrook Station Updated Final Safety Analysis Report (UFSAR) Section 3.6(B).2.1(a) provided a basis to eliminate locations in each piping run or branch run from further consideration as high energy line break locations on the basis of low fatigue including intermediate location when the CUF was less than 0.1.

Selection of pipe failure locations for evaluation of the consequences on nearby essential systems, components, and structures, except for the reactor coolant loop, is in accordance with Regulatory Guide 1.46, and NRC Branch Technical Positions ASB 3-1 and MEB 3-1. A revised stress analysis also permitted omission of the surge line intermediate breaks. A leak-before-break (LBB) analysis eliminated large breaks in the main reactor coolant loops.

The surge line intermediate break locations were eliminated based on usage factor. The most recent piping analysis confirmed the elimination of these break locations. The analysis that justified the elimination of these intermediate locations in the surge line is therefore a TLAA.

Since the 60 year projected cycles are bounded by the original design cycles, the present intermediate locations with CUF less than 0.1 remain valid for the period of extended operation.

The analyses remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.2.4.5.4 Fuel Transfer Tube Bellows Design Cycles

The fuel transfer tube assembly connects the fuel transfer canal (inside the containment structure) to the transfer pool (inside the spent fuel handling building). The fuel transfer tube assembly passes through the containment wall and through the exterior wall of the spent fuel handling building. The fuel transfer tube assembly is comprised of a 24-inch diameter penetration sleeve penetrating through the containment and spent fuel building walls and three (3) sets of expansion joints (bellows). The penetration sleeve and the three bellows perform a water-retaining intended function, and are within the scope of license renewal.

The fatigue analysis for each of the three bellows is based on the consideration of 20 occurrences of the Operating Basis Earthquake, each occurrence having 20 cycles of maximum response therefore, this design analysis is a TLAA requiring evaluation for the period of extended operation.

It is projected that 1 OBE would occur for Seabrook Station in 60 years of operation. Since the number of occurrences projected for 60 years is below the design limit of 5 occurrences of 10 cycles the design analysis remains valid for the period of extended operation.

The analyses remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.2.4.5.5 Crane Load Cycle Limits

A.2.4.5.5.1 Polar Gantry Crane

The design specification for the 420/50-ton Polar Crane in the containment structure at Seabrook Station required that the crane conform to the design requirements of Crane Manufacturers Association of America (CMAA)

Specification 70, "*Specifications for Electric Overhead Traveling Cranes*". Service requirements specified for the design of this crane correspond to the cyclic loading requirements of CMAA 70, Class A. This evaluation of cycles over the 40 year life is the basis of a safety determination and is, therefore, a TLAA.

The estimated number of lifts for the Polar Crane over the remaining 40 years of service (which includes 20 years of Extended Operation) is 19,440 with most of the lifts being less than 2500 pounds. This rate is based on refueling outage use, therefore, the first 20 years of service life for the Polar Crane would include approximately 10,000 load cycles. Thus, the total service life load cycles will be approximately 30,000. Since the total number of lifts is less than the allowable design value of up to 100,000 cycles, the Polar Crane load cycle fatigue analyses for Seabrook Station remains valid for 60 years of plant operation.

The analyses remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.2.4.5.5.2 Cask Handling Crane

The original Seabrook Station Cask Handling Crane was replaced in 2008 by a single failure-proof crane rated for 130 tons (main hoist) and 5 tons (each of two auxiliary hoists). To meet single failure criteria, each of these cranes was designed to the requirement of ASME NOG-1-2004, NUREG-0554, and NUREG-0612. The cranes were also designed to Crane Manufacturers Association of America (CMAA) Specification 70, "*Specifications for Electric Overhead Traveling Cranes*", with an allowable design life cycle range of up to 100,000 cycles. This evaluation of cycles over the projected 40-year life is the basis of a safety determination and has been identified as a TLAA requiring evaluation for the period of extended operation.

The projected number of major lifts for the Cask Handling Crane is less than 500 cycles. This estimate is based upon the expected number of casks that must be handled during each cask loading campaign and the projected number of campaigns through the period of extended operation. Allowing for double that number for minor lifts, or 1000 cycles, the estimated number of lifts for the Cask Handling Crane, 1500 cycles, is much less than the maximum allowable design value of 100,000 cycles, the Cask Handling Crane load cycle fatigue analyses remain valid for 60 years of plant operation.

The analyses remain valid for the period of extended operation in accordance with 10 CFR 54.21 (c)(1)(i).

A.2.4.5.6 Service Level I Coatings Qualification

Service Level 1 coatings used at Seabrook Station are in compliance with the applicable ANSI standards for coating systems inside containment. In a design basis accident, the Emergency Core Cooling System (ECCS) at Seabrook Station pumps water from inside the containment sump to the reactor

vessel to keep the core covered with water and make up losses from the pipe break location. These coatings could potentially detach during a design basis accident and the coating debris could contribute to flow blockage of ECCS suction strainers. The ECCS has suction piping located below the waterline inside the sump. Since it is assumed that the degree of radiation exposure used in the original qualification testing was intended to bound 40 years of operation, qualification of Service Level 1 coatings is considered a TLAA.
Seabrook Station Service Level I Coatings are managed by the ASME Section XI, Inservice Inspection, Subsection IWE Program, B.2.1.27 and Procedure for Application of Service Level I Coatings. Seabrook Station periodically conducts condition assessments of Service Level I coatings inside containment.

The periodic condition assessments, and the resulting repair/replacement activities, assure that the amount of Service Level 1 coatings which may be susceptible to detachment from the substrate during a LOCA event is minimized. The program provides for maintenance of coatings for the period of extended operation in accordance with 10 CFR 54.21 (c)(1)(iii).

A.2.4.5.7 Canopy Seal Clamp Assemblies

The canopy seal clamp assemblies were designed for a 40 year design life on the basis of meeting stress limits. The original fatigue analysis considered the forces that would be applied to the center head adapter which maximized the moments on the J-Grove weld and moment along the length of the adapter. The fatigue analysis for the Canopy Seal Clamps is based on the consideration of 400 cycles consisting of 20 occurrences of the Operating Basis Earthquake, each occurrence having 20 cycles of maximum response. This design analysis is a TLAA requiring evaluation for the period of extended operation.

It is projected that 1 OBE would occur for Seabrook Station in 60-years of operation. Since the number of occurrences projected for 60-years is below the design limit of 5 occurrences of 10 cycles the design analysis remains valid for the period of extended operation.

The analysis remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.2.4.5.8 Hydrogen Analyzer

The Seabrook Station Hydrogen Analyzer was evaluated with respect to radiation exposure. The UFSAR contains accumulated radiation dose limits for a 40-year operating period.

The operational dose for 40-year is 5×10^6 rads.

The projected maximum 40-year exposure comes from three sources; the gas in the analyzers themselves, the gas in the piping in the room, and the shine from the containment atmosphere through the penetrations into the room. The dose to the recombiner from these three sources is 7.2×10^3 rads annually. This leads to a projected 60-year dose of 4.32×10^5 rads which is less than the 40-year design dose.

The analysis remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.2.4.5.9 Mechanical Equipment Qualification

The Seabrook Station CLB commits to the review and evaluation of the environmental qualification of mechanical equipment to demonstrate compliance with 10 CPR Part 50 General Design Criteria Appendix A.

Results of this evaluation demonstrate safety-related active mechanical equipment located in harsh environments had been adequately addressed.

Since a period of 40 years was used to determine the normal service radiation exposure to the equipment, mechanical equipment qualification (MEQ) is considered a TLAA.

The design basis event conditions during the period of extended operation will remain the same as those in the current license period which have been adjusted to account for previously approved power uprate conditions. Therefore, the design basis event parameters, including the temperature, pressure and time profiles, do not require further evaluation as TLAAs for license renewal.

The effects of aging on the intended function(s) of equipment included under Mechanical Equipment Qualification will be adequately addressed for the period of extended operation. Calculations for Mechanical Equipment Qualification will be revised prior to entering the period of extended operation. Revision of MEQ calculations will be accomplished using techniques currently used under the CLB for equipment qualification including analytical methods, replacement of radiation sensitive materials or equipment replacement, in accordance with 10 CFR 54.21(c)(1)(ii).

A.2.4.5.10 Diesel Generator Thermal Cycle Evaluation

The Emergency Diesel Generators provide Emergency Power to Buses 5 and 6. The Emergency Diesel Generators were analyzed for thermal cycling by the engine manufacturer for Environmental Qualification in accordance with IEEE-323. The manufacturer qualified the Diesel Generator for 5454 Full-Temperature Cycles for the forty year design life of the plant. Under current plant operating practices, the Emergency Diesel Generators are operated only occasionally during periodic surveillance and maintenance testing. Monthly testing over 60 years would contribute 720 cycles. Assuming an equal number of starts for maintenance and actual events an additional 1440 cycles could occur. These actual and potential cycles combined equal slightly more than 2160 cycles for the Emergency Diesel Generators. The projected 60 year cycles is much less than the design basis thermal cycling for 40 years.

The analyses will remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.3 LICENSE RENEWAL COMMITMENT LIST

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
1.	PWR Vessel Internals	An inspection plan for Reactor Vessel Internals will be submitted for NRC review and approval at least twenty-four months prior to entering the period of extended operation.	A.2.1.7	Program to be implemented prior to the period of extended operation. Inspection plan to be submitted to NRC not less than 24 months prior to the period of extended operation.
2.	Closed-Cycle Cooling Water	Enhance the program to include visual inspection for cracking, loss of material and fouling when the in-scope systems are opened for maintenance.	A.2.1.12	Prior to the period of extended operation
3.	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Enhance the program to monitor general corrosion on the crane and trolley structural components and the effects of wear on the rails in the rail system.	A.2.1.13	Prior to the period of extended operation
4.	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Enhance the program to list additional cranes for monitoring.	A.2.1.13	Prior to the period of extended operation
5.	Compressed Air Monitoring	Enhance the program to include an annual air quality test requirement for the Diesel Generator compressed air sub system.	A.2.1.14	Prior to the period of extended operation
6.	Fire Protection	Enhance the program to perform visual inspection of penetration seals by a fire protection qualified inspector.	A.2.1.15	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
7.	Fire Protection	Enhance the program to add inspection requirements such as spalling, and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates by qualified inspector.	A.2.1.15	Prior to the period of extended operation.
8.	Fire Protection	Enhance the program to include the performance of visual inspection of fire-rated doors by a fire protection qualified inspector.	A.2.1.15	Prior to the period of extended operation.
9.	Fire Water System	Enhance the program to include NFPA 25 guidance for "where sprinklers have been in place for 50 years, they shall be replaced or representative samples from one or more sample areas shall be submitted to a recognized testing laboratory for field service testing".	A.2.1.16	Prior to the period of extended operation.
10.	Fire Water System	Enhance the program to include the performance of periodic flow testing of the fire water system in accordance with the guidance of NFPA 25.	A.2.1.16	Within ten years of entering the period of extended operation.
11.	Fire Water System	Enhance the program to include the performance of periodic visual inspection of the internal surface of the fire protection system upon each entry to the system for routine or corrective maintenance. This inspection will be performed no earlier than 10 years before the period of extended operation.	A.2.1.16	Prior to the period of extended operation.
12.	Aboveground Steel Tanks	Enhance the program to include components and aging effects required by the Aboveground Steel Tanks.	A.2.1.17	Prior to the period of extended operation.
13.	Aboveground Steel Tanks	Enhance the program to include an ultrasonic inspection and evaluation of the internal bottom surface of the two Fire Protection Water Storage Tanks.	A.2.1.17	Within ten years of entering the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
14.	Fuel Oil Chemistry	Enhance program to add requirements to 1) sample and analyze new fuel deliveries for biodiesel prior to offloading to the Auxiliary Boiler fuel oil storage tank and 2) periodically sample stored fuel in the Auxiliary Boiler fuel oil storage tank.	A.2.1.18	Prior to the period of extended operation.
15.	Fuel Oil Chemistry	Enhance the program to add requirements to check for the presence of water in the Auxiliary Boiler fuel oil storage tank at least once per quarter and to remove water as necessary.	A.2.1.18	Prior to the period of extended operation.
16.	Fuel Oil Chemistry	Enhance the program to require draining, cleaning and inspection of the diesel fire pump fuel oil day tanks on a frequency of at least once every ten years.	A.2.1.18	Prior to the period of extended operation.
17.	Fuel Oil Chemistry	Enhance the program to require ultrasonic thickness measurement of the tank bottom during the 10-year draining, cleaning and inspection of the Diesel Generator fuel oil storage tanks, Diesel Generator fuel oil day tanks, diesel fire pump fuel oil day tanks and auxiliary boiler fuel oil storage tank.	A.2.1.18	Prior to the period of extended operation.
18.	Reactor Vessel Surveillance	Enhance the program to specify that all pulled and tested capsules, unless discarded before August 31, 2000, are placed in storage.	A.2.1.19	Prior to the period of extended operation.
19.	Reactor Vessel Surveillance	Enhance the program to specify that if plant operations exceed the limitations or bounds defined by the Reactor Vessel Surveillance Program, such as operating at a lower cold leg temperature or higher fluence, the impact of plant operation changes on the extent of Reactor Vessel embrittlement will be evaluated and the NRC will be notified.	A.2.1.19	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
20.	Reactor Vessel Surveillance	Enhance the program as necessary to ensure the appropriate withdrawal schedule for capsules remaining in the vessel such that one capsule will be withdrawn at an outage in which the capsule receives a neutron fluence that meets the schedule requirements of 10 CFR 50 Appendix H and ASTM E185-82 and that bounds the 60-year fluence, and the remaining capsule(s) will be removed from the vessel unless determined to provide meaningful metallurgical data.	A.2.1.19	Prior to the period of extended operation.
21.	Reactor Vessel Surveillance	Enhance the program to ensure that any capsule removed, without the intent to test it, is stored in a manner which maintains it in a condition which would permit its future use, including during the period of extended operation.	A.2.1.19	Prior to the period of extended operation.
22.	One-Time Inspection	Implement the One Time Inspection Program.	A.2.1.20	Within ten years of entering the period of extended operation.
23.	Selective Leaching of Materials	Implement the Selective Leaching of Materials Program.	A.2.1.21	Within five years of entering the period of extended operation.
24.	Buried Piping Inspection	Implement the Buried Piping And Tanks Inspection Program.	A.2.1.22	Within ten years of entering the period of extended operation.
25.	One-Time Inspection of ASME Code Class 1 Small Bore-Piping	Implement the One-Time Inspection of ASME Code Class 1 Small Bore-Piping Program.	A.2.1.23	Within ten years of entering the period of extended operation.
26.	External Surfaces Monitoring	Enhance the program to specifically address the scope of the program, relevant degradation mechanisms and effects of interest, the refueling outage inspection frequency, the inspections of opportunity for possible corrosion under insulation, the training requirements for inspectors and the required periodic reviews to determine	A.2.1.24	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
		program effectiveness.		
27.	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.	A.2.1.25	Prior to the period of extended operation.
28.	Lubricating Oil Analysis	Enhance the program to add required equipment, lube oil analysis required, sampling frequency, and periodic oil changes.	A.2.1.26	Prior to the period of extended operation.
29.	Lubricating Oil Analysis	Enhance the program to sample the oil for the Switchyard SF6 compressors and the Reactor Coolant pump oil collection tanks.	A.2.1.26	Prior to the period of extended operation.
30.	Lubricating Oil Analysis	Enhance the program to require the performance of a one-time ultrasonic thickness measurement of the lower portion of the Reactor Coolant pump oil collection tanks prior to the period of extended operation.	A.2.1.26	Prior to the period of extended operation.
31.	ASME Section XI, Subsection IWL	Enhance procedure to include the definition of “Responsible Engineer”.	A.2.1.28	Prior to the period of extended operation.
32.	Structures Monitoring Program	Enhance procedure to add the aging effects, additional locations, inspection frequency and ultrasonic test requirements.	A.2.1.31	Prior to the period of extended operation.
33.	Structures Monitoring Program	Enhance procedure to include inspection of opportunity when planning excavation work that would expose inaccessible concrete.	A.2.1.31	Prior to the period of extended operation.
34.	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification	Implement the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program.	A.2.1.32	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
	Requirements			
35.	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Implement the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program.	A.2.1.33	Prior to the period of extended operation.
36.	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Implement the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program.	A.2.1.34	Prior to the period of extended operation.
37.	Metal Enclosed Bus	Implement the Metal Enclosed Bus program.	A.2.1.35	Prior to the period of extended operation.
38.	Fuse Holders	Implement the Fuse Holders program.	A.2.1.36	Prior to the period of extended operation.
39.	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Implement the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program.	A.2.1.37	Prior to the period of extended operation.
40.	345 KV SF_6 Bus	Implement the 345 KV SF_6 Bus program.	A.2.2.1	Prior to the period of extended operation.
41.	Metal Fatigue of Reactor Coolant Pressure Boundary	Enhance the program to include additional transients beyond those defined in the Technical Specifications and UFSAR.	A.2.3.1	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
42.	Metal Fatigue of Reactor Coolant Pressure Boundary	Enhance the program to implement a software program, to count transients to monitor cumulative usage on selected components.	A.2.3.1	Prior to the period of extended operation.
43.	Pressure –Temperature Limits, including Low Temperature Overpressure Protection Limits	Seabrook Station will submit updates to the P-T curves and LTOP limits to the NRC at the appropriate time to comply with 10 CFR 50 Appendix G.	A.2.4.1.4	The updated analyses will be submitted at the appropriate time to comply with 10 CFR 50 Appendix G, Fracture Toughness Requirements.
44.	Environmentally-Assisted Fatigue Analyses (TLAA)	(1) Consistent with the Metal Fatigue of Reactor Coolant Pressure Boundary Program Seabrook Station will update the fatigue usage calculations using refined fatigue analyses, if necessary, to determine acceptable CUFs (i.e., less than 1.0) when accounting for the effects of the reactor water environment. This includes applying the appropriate F_{en} factors to valid CUFs determined from an existing fatigue analysis valid for the period of extended operation or from an analysis using an NRC-approved version of the ASME code or NRC-approved alternative (e.g., NRC-approved code case). (2) If acceptable CUFs cannot be demonstrated for all the selected locations, then additional plant-specific locations will be evaluated. For the additional plant-specific locations, if CUF, including environmental effects is greater than 1.0, then Corrective Actions will be initiated, in accordance with the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1. Corrective Actions will include inspection, repair, or replacement of the affected locations before exceeding a CUF of 1.0 or the effects of fatigue will be managed by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined	A.2.4.2.3	At least two years prior to entering the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
		by a method accepted by the NRC).		
45.	Mechanical Equipment Qualification	Revise Mechanical Equipment Qualification Files.	A.2.4.5.9	Prior to the period of extended operation.

APPENDIX B

AGING MANAGEMENT PROGRAMS

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B.1 INTRODUCTION

B.1.1 OVERVIEW

The license renewal Aging Management Program descriptions are provided in this appendix for each program credited for managing aging effects.

The demonstration that aging effects will be adequately managed is performed by evaluating the aging management programs and associated activities against certain required attributes. Each of the aging management programs described in this appendix has ten elements which are consistent with the attributes described in NUREG-1800 Appendix A.1, "*Aging Management Review – Generic (Branch Technical Position RLSB-1)*" and in NUREG-1800 Table A.1-1 *"Elements of An Aging Management Program for License Renewal"*. The ten element detail is only provided when the program is plant specific.

Credit for existing plant programs was considered and taken where appropriate. The program applicability to Systems, Structure and Components (SSCs) and commodities was considered and a determination made with respect to the effectiveness of the program in managing the aging effects.

Plant existing programs applied to age management are frequently associated with regulatory commitments or requirements. Upon evaluation many of the existing programs meet the license renewal 10 element attributes. If an existing program did not adequately manage the identified aging effect, the program was enhanced as necessary. New programs were created when no program existed.

B.1.2 PROGRAM PRESENTATION

For those aging management programs that are comparable to the programs described in Sections X and XI of NUREG-1801, or are consistent with exceptions, each program discussion is presented in the following format:

1. Program Description – Summary description of the Seabrook Station program

2. NUREG-1801 Consistency – A statement of the consistency of the program with respect to the NUREG-1801 program

3. Exceptions to NUREG-1801 – Statement of exception(s) to the NUREG-1801 program with justification

4. Enhancements – Summary of enhancements, if needed, to attain consistency with NUREG-1801

5. Operating Experience – Relevant operating experience pertaining to the program

6. Conclusion – A statement attesting to the program adequacy for managing associated aging effects

The statement of consistency of the Seabrook Station Aging Management Program with respect to the NUREG-1801 program will take one of the three following forms:

1. The Aging Management Program states that the plant program is consistent with the recommendations of NUREG-1801, identifies no exceptions to NUREG-1801, and identifies no enhancements. This statement affirms that

   a. the plant program corresponds to and contains the elements of the referenced NUREG-1801 program;

   b. the conditions at the plant are bounded by the conditions for which the NUREG-1801 program was evaluated to the extent such conditions are specified in the NUREG-1801 program description; and

   c. verifications have been completed and documented.

   Therefore, the Aging Management Program identified in NUREG-1801 is being used.

2. The Aging Management Program states that the plant program is consistent with the recommendations of NUREG-1801 with exception(s), and either identifies enhancements or identifies no enhancements. This statement affirms that

   a. with the exception(s) identified, and enhancements, if any, the plant program corresponds to and contains the elements of the referenced NUREG-1801 program;

   b. the conditions at the plant are bounded by the conditions for which the NUREG-1801 program was evaluated to the extent such conditions are specified in the NUREG-1801 program description; and

   c. verifications have been completed and documented.

Therefore the Aging Management Program identified in NUREG-1801 is being used, as modified by the exceptions. A justification for each identified exception is provided.

3. The Aging Management Program states that the plant program is consistent with the recommendations of NUREG-1801, identifies no exceptions to NUREG-1801, but identifies enhancements. This statement affirms that

   a. with those enhancements, the plant program corresponds to and contains the elements of the referenced NUREG-1801 program;

   b. the conditions at the plant are bounded by the conditions for which the NUREG-1801 program was evaluated to the extent such conditions are specified in the NUREG-1801 description; and

   c. verifications have been completed and are documented.

   Therefore the Aging Management Program identified in NUREG-1801 is being used.

The plant specific aging management programs are described in terms of the 10 program elements in NUREG-1800, Section A.1.2.3 “Aging Management program Elements”.

B.1.3 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

The FPL/NextEra Energy Quality Assurance Program implements the requirements of 10 CFR 50, Appendix B, and is consistent with the summary in Appendix A of NUREG-1801. The elements of corrective action, confirmation process, and administrative controls in the Quality Assurance Program are applicable to both safety related and non-safety related systems, structures, and components that are subject to an Aging Management Review. Each element will be implemented as follows:

Corrective Actions

FPL/NextEra Energy Quality Assurance procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. Conditions adverse to quality, such as failures, malfunctions, deviations, defective material and equipment, and non-conformances, 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 preclude 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.

Confirmation Process

FPL/NextEra Energy Quality Assurance procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. Corrective actions and administrative controls are accomplished by the implementation of the Corrective Action Program and Nuclear Fleet procedures. The confirmation process is part of the Corrective Action Program and includes:

1. review to assure that proposed actions are adequate
2. tracking and reporting of open corrective actions
3. review of corrective action effectiveness

Any follow-up activities required by the confirmation process are documented in accordance with the Corrective Action Program. The Corrective Action Program encompasses the confirmation process for Aging Management Programs and activities.

Administrative Controls

FPL/NextEra Energy Quality Assurance procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. These administrative controls include the provisions related to organization and management, procedures, record keeping, review and audit, and reporting.

B.1.4 OPERATING EXPERIENCE

Operating experience is an important resource in identifying aging effects and evaluating the effectiveness of Aging Management Programs. The Corrective Action Program, system health reports, self assessments, Nuclear Oversight Audits, and interviews with site personnel were the primary sources of plant-specific operating experience related to these Aging Management Programs.

Since the materials used for structures and components at Seabrook Station are common to most nuclear power plants and many non-nuclear power plants that have long operating histories, industry-wide operating experience is also valuable. Screening of a large body of operating data yielded much useful data relating to aging of plant structures and components.

The Seabrook Station plant-specific data and the industry-wide operating data were valuable in:

1. Providing bases for determining which aging effects require management.

2. Demonstrating that existing programs are adequately managing the aging effects.

3. Pointing out the need to enhance existing programs or the need for entirely new programs.

The effects and mechanisms of age related degradation for SSCs at Seabrook Station were developed from several sources. They include plant-specific and industry operating experience and interviews with site personnel. No new aging effects were identified. Known aging effects and mechanisms for a given environment and material were incorporated into NUREG-1801, up to the time of its publication in Sept. 2005.

With respect to Aging Management Programs, existing programs/ activities must demonstrate, with objective evidence, that they are effective in managing the aging effects if credited. Operating experience related to the program/activity, including past corrective actions resulting in program enhancements, provides objective evidence the program adequately manages the aging effects.

The FPL/NextEra Energy Operating Experience Program provides guidance for using, sharing, and evaluating operating experience information at FPL/NextEra Energy Nuclear Division sites. The procedure governing this program provides guidance on the effective and efficient use of operating experience information. The primary objectives of the FPL/NextEra Energy Operating Experience Program are:

1. Systematic evaluation of significant nuclear plant operating experiences.

2. Incorporation of lessons learned into appropriate plant practices, policies, programs, and procedures with the objective of preventing similar issues.

3. Sharing of lessons learned internally and with other utilities to promote industry-wide safety and reliability.

By increasing awareness of previous FPL/NextEra Energy Nuclear Division and industry events and issues, the FPL/NextEra Energy Operating Experience Program expects to prevent similar events from occurring at FPL/NextEra Energy Nuclear Division sites. The FPL/NextEra Energy Operating Experience

Program ensures that information that has the potential to affect safe and reliable station operation is properly screened and addressed to ensure timely response. This program promotes the identification and transfer of lessons learned from industry, and internal events, such that these lessons are shared between the FPL/NextEra Energy Nuclear Division and the nuclear industry. This program describes the methodology for receiving, processing, status reporting, screening, reviewing, evaluating, and taking preventive/corrective actions in response to operating experience information. This program satisfies the requirements of NUREG-0737, I.C.5, *"Procedures for Feedback of Operating Experience to Plant Staff"* and 10 CFR 50.65, *"Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"*, Sections (a)(1) and (a)(2).

B.1.5 NUREG-1801 CHAPTER XI AGING MANAGEMENT PROGRAMS

The following Aging Management Programs are described in this appendix. The programs are either generic in nature as discussed in NUREG-1801, Chapter XI, *"Aging Management Programs (AMPs)"* or are plant-specific. NUREG-1801 Chapter XI programs are listed in Section B.2.1. Plant-specific programs are listed in Section B.2.2. All generic programs are either fully consistent with or are consistent with some exceptions with programs discussed in NUREG-1801. Programs are identified as either existing or new.

1. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) [Existing]
2. Water Chemistry (B.2.1.2) [Existing]
3. Reactor Head Closure Studs (B.2.1.3) [Existing]
4. Boric Acid Corrosion (B.2.1.4) [Existing]
5. Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (B.2.1.5) [Existing]
6. Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) (B.2.1.6) [Not Used]
7. PWR Vessel Internals (B.2.1.7) [New]
8. Flow-Accelerated Corrosion (B.2.1.8) [Existing]
9. Bolting Integrity (B.2.1.9) [Existing]
10. Steam Generator Tube Integrity (B.2.1.10) [Existing]
11. Open-Cycle Cooling Water System (B.2.1.11) [Existing]
12. Closed-Cycle Cooling Water System (B.2.1.12) [Existing]

13. Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.13) [Existing]
14. Compressed Air Monitoring (B.2.1.14) [Existing]
15. Fire Protection (B.2.1.15) [Existing]
16. Fire Water System (B.2.1.16) [Existing]
17. Aboveground Steel Tanks (B.2.1.17) [Existing]
18. Fuel Oil Chemistry (B.2.1.18) [Existing]
19. Reactor Vessel Surveillance (B.2.1.19) [Existing]
20. One-Time Inspection (B.2.1.20) [New]
21. Selective Leaching of Materials (B.2.1.21) [New]
22. Buried Piping and Tanks Inspection (B.2.1.22) [New]
23. One-Time Inspection of ASME Code Class 1 Small Bore-Piping (B.2.1.23) [New]
24. External Surfaces Monitoring (B.2.1.24) [Existing]
25. Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) [New]
26. Lubricating Oil Analysis (B.2.1.26) [Existing]
27. ASME Section XI, Subsection IWE (B.2.1.27) [Existing]
28. ASME Section XI, Subsection IWL (B.2.1.28) [Existing]
29. ASME Section XI, Subsection IWF (B.2.1.29) [Existing]
30. 10 CFR 50, Appendix J (B.2.1.30) [Existing]
31. Structures Monitoring Program (B.2.1.31) [Existing]
32. Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements (B.2.1.32) [New]
33. Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements Used in Instrumentation Circuits (B.2.1.33) [New]
34. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements (B.2.1.34) [New]
35. Metal Enclosed Bus (B.2.1.35) [New]
36. Fuse Holders (B.2.1.36) [New]

37. Electrical Cable Connections Not Subject to 10 CFR 50.49 EQ Requirements (B.2.1.37) [New]

38. 345 KV SF6 Bus (B.2.2.1) [New]

39. Boral Monitoring (B.2.2.2) [Existing]

40. Nickel-Alloy Nozzles and Penetrations (B.2.2.3) [Existing]

B.1.6 NUREG-1801 CHAPTER X AGING MANAGEMENT PROGRAMS

The following NUREG-1801 Chapter X, "*Time-Limited Aging Analyses Evaluation of Aging Management Programs Under 10 CFR 54.21 (c)(1)(iii)"*: Aging Management Programs are described in Section B.2.3 of this appendix as indicated. Programs are identified as either existing or new.

1. Metal Fatigue of Reactor Coolant Pressure Boundary (B.2.3.1) [Existing]

2. Environmental Qualification (EQ) of Electrical Components (Section B.2.3.2) [Existing]

B.2 AGING MANAGEMENT PROGRAMS

B.2.0 AGING MANAGEMENT CORRELATION CHART- NUREG-1801 TO SEABROOK STATION PROGRAMS

The following Aging Management Programs are discussed in this appendix. The programs are as discussed in NUREG-1801 or are specific to Seabrook Station. All programs are fully consistent with NUREG-1801 or are consistent with exceptions to the programs discussed in NUREG-1801.

NUREG-1801 Number	NUREG-1801 Program	Seabrook Station Program
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
XI.M2	Water Chemistry	Water Chemistry
XI.M3	Reactor Head Closure Studs	Reactor Head Closure Studs
XI.M4	BWR Vessel ID Attachment Welds	Not Applicable (Seabrook Station is a PWR)
XI.M5	BWR Feedwater Nozzle	Not Applicable (Seabrook Station is a PWR)
XI.M6	BWR Control Rod Drive Return Line Nozzle	Not Applicable (Seabrook Station is a PWR)
XI.M7	BWR Stress Corrosion Cracking	Not Applicable (Seabrook Station is a PWR)
XI.M8	BWR Penetrations	Not Applicable (Seabrook Station is a PWR)
XI.M9	BWR Vessel Internals	Not Applicable (Seabrook Station is a PWR)
XI.M10	Boric Acid Corrosion	Boric Acid Corrosion
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 RV Closure Heads of PWRS
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	Not Used. Not credited for aging management.

NUREG-1801 Number	NUREG-1801 Program	Seabrook Station Program
XI.M13	Thermal Aging and neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Not Used. Not credited for aging management.
XI.M14	Loose Part Monitoring	Not Used. Not credited for aging management.
XI.M15	Neutron Noise Monitoring	Not Used. Not credited for aging management.
XI.M16	PWR Vessel Internals	PWR Vessel Internals
XI.M17	Flow-Accelerated Corrosion	Flow Accelerated Corrosion
XI.M18	Bolting Integrity	Bolting Integrity
XI.M19	Steam Generator Tube Integrity	Steam Generator Tube Integrity
XI.M20	Open-Cycle Cooling Water System	Open-Cycle Cooling Water System
XI.M21	Closed-Cycle Cooling Water System	Closed-Cycle Cooling Water System
XI.M22	Boraflex Monitoring	Not Used. Not credited for aging management. This material is not credited in the Spent Fuel Pool Criticality Analysis
XI.M23	Inspection of Overhead Heavy Load and Light Load (Related to Refueling)Handling Systems	Inspection of Overhead Heavy Load And Light Load (Related to Refueling) Handling Systems
XI.M24	Compressed Air Monitoring	Compressed Air Monitoring
XI.M25	BWR Reactor Water Cleanup System	Not Applicable (Seabrook Station is a PWR)
XI.M26	Fire Protection	Fire Protection
XI.M27	Fire Water System	Fire Water System
XI.M28	Buried Piping and Tanks Surveillance	Not Used. The aging effects associated with buried piping and tanks will be adequately managed by XI.M34, Buried Piping Inspection Program (B.2.1.22).
XI.M29	Aboveground Steel Tanks	Above Ground Steel Tanks

NUREG-1801 Number	NUREG-1801 Program	Seabrook Station Program
XI.M30	Fuel Oil Chemistry	Fuel Oil Chemistry
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance
XI.M32	One-Time Inspection	One-Time Inspection
XI.M33	Selective Leaching of Materials	Selective Leaching of Materials
XI.M34	Buried Piping and Tanks Inspection	Buried Piping and Tanks Inspection
XI.M35	One-Time Inspection of ASME Code Class 1 Small Bore-Piping	One-Time Inspection of ASME Code Class 1 Small Bore Piping
XI.M36	External Surfaces Monitoring	External Surfaces Monitoring
XI.M37	Flux Thimble Tube Inspection	Not Used. Not credited for aging management.
XI.M38	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components
XI.M39	Lubricating Oil Analysis	Lubricating Oil Analysis
XI.S1	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE
XI.S2	ASME Section XI, Subsection IWL	ASME Section XI, Subsection IWL
XI.S3	ASME Section XI, Subsection IWF	ASME Section XI, Subsection IWF
XI.S4	10 CFR 50, Appendix J	10 CFR Part 50 Appendix J
X1.S5	Masonry Wall Program	Included In Structures Monitoring Program
XI.S6	Structures Monitoring Program	Structures Monitoring Program
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	Included In Structures Monitoring Program
XI.S8	Protective Coating Monitoring and Maintenance Program	Not Used. Not credited for aging management.
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 EQ Requirements

NUREG-1801 Number	NUREG-1801 Program	Seabrook Station Program
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 EQ Requirements Used in Inst. Circuits
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 Requirements
XI.E4	Metal Enclosed Bus	Metal Enclosed Bus
XI.E5	Fuse Holders	Fuse Holders
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
X.M1	Metal Fatigue Of Reactor Coolant Pressure Boundary	Metal Fatigue of Reactor Coolant Pressure Boundary Program
X.S1	Concrete Containment Tendon Prestress	Not Used. Not credited for aging management.
X.E1	Environmental Qualification (EQ) Of Electrical Components	Environmental Qualification (EQ) of Electric Components
N/A	Seabrook Station Plant Specific Program	345 KV SF6 Bus
N/A	Seabrook Station Plant Specific Program	Boral Monitoring
N/A	Seabrook Station Plant Specific Program	Nickel-Alloy Nozzles and Penetrations

B.2.1 NUREG-1801 CHAPTER XI AGING MANAGEMENT PROGRAMS

B.2.1.1 ASME SECTION XI INSERVICE INSPECTION, SUBSECTIONS IWB, IWC, AND IWD

Program Description

The Seabrook Station ASME Section XI, Subsections IWB, IWC and IWD Inservice Inspection Program is an existing program that manages the aging effects of cracking due to cyclic loading, primary water stress corrosion cracking, stress corrosion cracking, cracking due to thermal and mechanical loading, loss of fracture toughness due to thermal aging embrittlement, loss of material due to general, pitting and crevice corrosion, and loss of material due to wear in ASME Code Class 1, 2, and 3 piping and components within the scope of License Renewal. The program includes periodic visual, surface and/or volumetric examinations of all ASME Code Class 1, 2 and 3 pressure-retaining components, their supports and integral attachments (including welds, pump casings, valve bodies and pressure-retaining bolting) and leakage tests of pressure retaining components. These are identified in ASME Section XI, *"Rules for Inservice Inspection of Nuclear Power Plant Components",* or commitments requiring augmented Inservice Inspections, and are within the scope of license renewal.

The Code of Federal Regulations, 10 CFR 50.55a, *"Codes and Standards",* requires that Inservice Inspection of ASME Code Class 1, 2, and 3 pressure retaining components, their integral attachments and supports be conducted in accordance with the latest edition of ASME Section XI approved by the NRC twelve months prior to the start of a ten-year interval. The Inservice Inspection Program for the second (2^{nd}) ten-year interval, which began on August 19, 2000 for Seabrook Station, implements the 1995 edition with the 1996 addenda, of ASME Section XI. The program is implemented in accordance with the requirements of 10 CFR 50.55a, with specified limitations, modifications and NRC-approved alternatives, and utilizes ASME Section XI, Subsections IWB, IWC, and IWD. The program provides for augmented inspections of components and their attachments as required or recommended by regulatory, or Nuclear Steam System Supplier (NSSS) technical publications.

The Seabrook Station ASME Section XI Program provides the requirements for Inservice Inspection, repair, and replacement of all ASME Code Class 1, 2, and 3 components within scope for license renewal. The program includes those components specified in subsections IWB-1100, IWC-1100, and IWD-1100 for Class 1, 2, and 3 components, respectively, and includes all pressure retaining components and their integral attachments. The components described in sub-articles IWB-1220, IWC-1220 and IWD-1220 (Components Exempt from Examination) are exempt from the examination and pressure test requirements of sub-articles IWB-2500, IWC-2500 and IWD-2500. The components in scope of the Seabrook Station ASME Section XI program are included in the Inservice Inspection program and repair and replacement activities, and are implemented in accordance with the requirements of ASME Section XI, subsection IWA-4000.

The Technical Specification commitments for the scope of this program, as described in the Seabrook Station In-service Inspection Reference Manual, are addressed in Technical Specification Sections 4.0.5, *"Surveillance Requirements for Inservice Inspection"*, and 6.7, *"Programs and Procedures".*

The Seabrook Station Inservice Inspection Program consists of condition monitoring activities that detect degradation of components before loss of intended function. No preventive or mitigating attributes are associated with these activities.

The Seabrook Inservice Inspection program utilizes ASME Section XI Tables IWB-2500-1, IWC-2500-1 and IWD-2500-1, for Class 1, 2 and 3 components respectively, to determine the examination requirements, develop the examination procedures, and schedule the examinations required for each inspection interval and the examinations for each inspection period. The tables specify the extent and schedule of the inspection and the examination methods for the components of pressure-retaining boundaries.

The Seabrook Station ASME Section XI Inservice Inspection Program includes a variety of inspection and testing activities that are designed to detect degradation due to aging effects prior to loss of intended function.

The extent and schedule of the inspection and test techniques prescribed by the program are designed to maintain structural integrity and ensure that aging effects will be discovered and repaired before the loss of a component intended function. Inspection can reveal crack initiation and growth, loss of material due to corrosion, leakage, and indications of degradation caused by wear or stress relaxation, such as verification of clearances, settings, physical displacements, loose or missing parts, debris, wear, erosion, or loss of integrity at bolted or welded connections.

The program uses three types of examination; visual, surface, and volumetric in accordance with the general requirements of Article IWA-2000. VT-1 visual examination detects discontinuities and imperfections, such as cracks, corrosion, wear, or erosion, on the surface of components. VT-2 visual examination detects evidence of leakage from pressure-retaining components, as required during the system pressure test. VT-3 visual examination (a) determines the general mechanical and structural condition of components by verifying parameters, such as clearances, settings, and physical displacements; and (b) detects discontinuities and imperfections, such as loss of integrity at bolted or welded connections, loose or missing parts, debris, corrosion, wear, or erosion.

Surface examination uses magnetic particle, liquid penetrant, or eddy current examinations to indicate the presence of surface discontinuities and flaws.

Volumetric examination uses radiographic, ultrasonic, or eddy current (for steam generator tubing only) examinations to indicate the presence of discontinuities or flaws throughout the volume of material. If used for examinations other than steam generator tube inspections, eddy current is considered a surface examination technique. The non-destructive examination (NDE) techniques used to inspect ASME Code Class 1, Class 2, and Class 3 components are consistent with the referenced ASME Section XI Code for those components.

Examination requirements for Class 1 and 2 pressure-retaining bolting are in accordance with ASME Section XI, Table IWB 2500-1 or IWC 2500-1. For Class 1 components, Table IWB 2500-1, examination category B-G-1, for bolting greater than 2 inches in diameter, specifies volumetric examination of studs and bolts and VT-1 visual examination of surfaces of nuts, washers, bushings, and flanges. Examination category B-G-2, for bolting 2 inches or smaller requires VT-1 visual examination of surfaces of bolts, studs, and nuts.

Examination Categories B-P and C-H, require VT-2 visual examination (IWA-5240) during system leakage testing of all pressure-retaining ASME Code Class 1 and 2 components, according to Tables IWB-2500-1 and IWC-2500-1 respectively. The extent and schedule of inspections, in accordance with Tables IWB-2500-1 and IWC-2500-1 ensure detection of aging degradation before the loss of the intended function. The Seabrook Station ASME Section XI Inservice Inspection Program performs the necessary inspections per the requirements of tables IWB-2500-1, IWC-2500-1, and IWD-2500-1. These inspections include the applicable portions of examination categories; B-A, B-B, B-D, B-G-1, B-G-2, B-K, B-L-2, B-M-2, B-N-1, B-N-2, B-N-3 B-O, B-P, C-A, C-B, C-C, C-F-1, C-F-2, C-H, D-A, and D-B. The applicable portions of categories B-F and B-J are currently included in the Risk Informed Inservice Inspection Program. Examination categories not listed above are not applicable to Seabrook Station.

The examinations listed above are based on specific ASME Code Editions and Addenda and will change throughout the extended period as required and/or allowed by 10 CFR 50.55a.

The examination schedules contained in the Seabrook Station Inservice Inspection Program meet the requirements of ASME Section XI, IWB-2412, IWC-2412, and IWD-2412, respectively (Inspection Program B). The Inservice Inspection Program also meets the requirements for the extent and frequency of examinations specified by the ASME Section XI, IWB-2500-1, IWC-2500-1, and IWD-2500-1 and in accordance with the requirements of 10 CFR 50.55a, with specified limitations, modifications and NRC-approved alternatives. If flaw indications or relevant conditions of degradation are found, additional examinations may be necessary.

In some cases, an evaluation in accordance with ASME Section XI, IWB-3100, IWC-3100, or IWD-3100 may be used to qualify a component with flaw indications as acceptable for continued service. In such cases, the areas containing such flaw indications and relevant conditions are reexamined during the next three inspection periods of IWB-2400 for Class 1 components and for the next inspection period of IWC-2400 and IWD-2400 for Class 2 and Class 3 components, respectively. Examinations that reveal indications that exceed the acceptance standards are extended to include additional examinations in accordance with ASME Section XI, IWB-2430, IWC-2430, or IWD-2430 for Class 1, 2, or 3 components, respectively. The Seabrook Station Inservice Inspection Program meets the ASME Section XI requirements with respect to inspection schedules, extent, method, and frequency of examination, flaw evaluations, and additional examinations.

Indications or relevant conditions are evaluated in accordance with IWB-3000, IWC-3000, or IWD-3000 for Class 1, 2, or 3 components, respectively. Examination results are evaluated in accordance with IWB-3100, IWC-3100, or IWD-3100 by comparing the results with the acceptance standards of IWB-3400 and IWB-3500 or IWC-3400 and IWC-3500 or IWD-3400 and IWD-3500 for Class 1 or Class 2 and 3 components, respectively. In rare cases, flaws exceeding the size of allowable flaws, as defined in IWB-3500 or IWC-3500 may be evaluated by using the analytical procedures of IWB-3600 or IWC-3600.

Repairs and replacements are performed in accordance with the Seabrook Station ASME Section XI Repair and Replacement Program.

NUREG-1801 Consistency

NUREG-1801, Rev 1, discusses the use of the 2001 edition including the 2002 and 2003 addenda of ASME Section XI code, but allows use of other editions of the ASME Code as long as there is justification. The Seabrook Station Inservice Inspection Program Plan for the second ten-year inspection interval effective from August 19, 2000 through August 18, 2010, approved per 10 CFR 50.55a, is based on the 1995 edition including the 1996 addenda. The next and subsequent 120-month inspection intervals for Seabrook Station will incorporate the requirements specified in the version of the ASME

Code incorporated into 10 CFR 50.55a twelve months before the start of the inspection interval.

This program is consistent with NUREG-1801 XI.M1.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues and events. Those issues and events, whether external or plant specific, that are potentially significant to the ASME Section XI Inservice Inspection Program are evaluated. The ASME Section XI Inservice Inspection Program is augmented, as appropriate, if these evaluations show that program changes will enhance program effectiveness.

Site specific Operating Experience is included below.

1. In February 2001, a post-outage review of the work performed on two valves to replace the body to bonnet gaskets revealed that there had been an *opportunity* to perform a VT-3 visual examination of the internal surface of the valve body during that work. ASME Section XI, Table IWB-2500-1, Examination Category B-M-2, Item No. B12.50 requires an internal surface examination of at least one valve in each group of similar valves during the Ten-Year Inservice Inspection Interval. These valves are two of six in a particular group. Although there was no requirement to perform a VT-3 visual examination during this work, doing so might have precluded the need to open and inspect another valve in this group during the ten year interval.

   As a result of this discovery, the applicable maintenance valve procedures were revised to add a note to the prerequisites section. The note states that a VT-3 visual examination may be required when a Class 1 valve, greater than 4 inches is disassembled. A sign off step was added that states that engineering has evaluated the need for a VT-3 visual examination.

   This example demonstrates that deficiencies in procedures are identified and updated as necessary to ensure the program remains effective.

2. In March, 2008, while performing a VT-2 visual examination during an ASME Section XI Inservice Inspection of the Containment Building Spray system, the VT-2 visual examiner identified excessive dry boric acid accumulation on Containment Building Spray system valve (CBS-V-17) gland leak-off plug. Subsequently, the boric acid leakage was evaluated per the Seabrook Station Boric Acid Corrosion Program and the gland leak-off plug was tightened and the leakage was stopped.

   Similarly, on September 6, 2006, while performing a VT-2 visual examination during an ASME Section XI Inservice Inspection of the Main Steam supply to the Emergency Feedwater Pump turbine, the VT-2 inspector identified a packing leak on a Main Steam valve (MS-V-402) with the Emergency Feedwater steam supply header pressurized to Main Steam header pressure. Subsequently, the packing was adjusted to stop the packing leak.

   These examples demonstrate that the VT-2 inspections per the ASME Section XI Inservice Inspection Program have been effective in identifying degraded conditions and corrective actions have been taken prior to loss of intended function.

3. Prior to all refueling outages in which ASME Section XI Inservice Inspections are scheduled to be performed, a review is conducted of all of the previous Inservice Inspection data reports. During data review for the upcoming Refueling Outage 12 (Spring of 2008) Inservice Inspection activity, an observation was made related to the regenerative heat exchanger shell circumferential welds. The two welds at issue were last examined during Refueling Outage 9 (Fall of 2003) and were not part of the planned Refueling Outage 12 Inservice Inspection scope.

   The previous data indicated that the examination area only included the inner 1/3 thickness of the weld plus 1/2 inch of the adjacent base material and not the required full volume of the weld plus 1/2 inch of the adjacent base material required by ASME Section XI table IWC-2500-1. This meant that the examination was performed only on a portion of the examination volume specified in ASME Section XI and the Seabrook Station Inservice Inspection Reference Manual.

   As a result of this limited inspection, a procedure update was processed to prevent recurrence. The required examination volume was inspected during that upcoming outage.

   This example demonstrates that deficiencies in procedures are identified and updated as necessary to ensure that the program remains effective.

4. In July 2009, a Nuclear Oversight Audit was performed on the Seabrook Station ASME Section XI Inservice Inspection Program. The Inservice Inspection audit evaluated the Seabrook Station Inservice Inspection Program, processes, personnel qualifications, and documentation/records for compliance with Regulatory and Seabrook Station requirements. The audit was performed through document review, personnel interviews, and field observations.

   The audit team concluded that Seabrook Station's implementation of the Inservice Inspection Program and related activities, and related Inservice Inspection Technical Specification surveillances are being performed at the required frequency and are effectively implemented in accordance with Regulatory, ASME Code, Seabrook Station, and Industry requirements.

   This example demonstrates that periodic assessments are performed to evaluate the effectiveness of the program and to identify the areas that need improvement to maintain the effective performance of the program.

5. During Refueling Outage 13 (Fall of 2009), an ultrasonic examination was performed on Train "B" Residual Heat Removal (RH) Mixing Tee to detect thermal fatigue cracking as recommended by Electric Power Research Institute Material Reliability Program (EPRI MRP-192), *"Materials Reliability Program: "Assessment of RHR Mixing Tee Thermal Fatigue in PWR Plants"*. The area examined included the downstream tee-to-pipe weld and the adjacent base material for 0.25 inch past the counterbore. The ultrasonic examination identified a rejectable indication in the pipe wall downstream of the Mixing Tee.

   Evaluation of the condition concluded that the flaw was indicative of thermal fatigue cracking in the 'B' Train Residual Heat Removal piping downstream of the mixing tee. Thermal fatigue cracking had been identified at the location of hot and cold water mixing in Residual Heat Removal Systems in foreign nuclear power plants as discussed in EPRI MRP-192. Mixing of hot and cold fluids at the mixing tee downstream of the heat exchanger had caused thermal fatigue cracking of the piping as specifically described in the EPRI MRP.

   An Operability Determination was performed to demonstrate the continued operability of the system. As part of the extent of condition review, an ultrasonic examination of the Train "A" Residual Heat Removal Mixing Tee was performed and no indications of cracking were identified. The piping downstream of the Train "B" Residual Heat Removal Mixing Tee was replaced after full core offload. Residual Heat Removal system run time history was reviewed and documented for both trains from plant startup through and including Cycle 13 in support of developing re-inspection intervals in accordance with MRP-192. The affected areas were included in the ASME Section XI Inservice Inspection Program for inspection at a frequency commensurate with that defined in MRP-192.

This example demonstrates that augmented inspections are conducted and appropriate actions taken in response to industry events.

These examples provide objective evidence that the Seabrook Station ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program has been effective in identifying degraded conditions in advance of any loss of intended function. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of the ASME Section XI Inservice Inspection program are performed to identify the areas that need improvement to maintain the effective performance of the program.

Conclusion

The Seabrook Station ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.2 WATER CHEMISTRY

Program Description

The Seabrook Station Water Chemistry Program is an existing program that manages the aging effects of cracking, loss of material, and reduction of heat transfer in the primary and secondary water systems. The primary scope of this program consists of the Reactor Coolant system and related auxiliary systems containing treated water, reactor coolant, treated borated water and steam. Chemistry programs are used to control water chemistry for impurities and rely upon periodic monitoring and control of detrimental contaminants below the levels known to cause cracking, loss of material or reduction of heat transfer. Seabrook Station is a pressurized water reactor and subscribes to those objectives and guidelines applicable to pressurized water reactors (PWRs).

NUREG-1801 Section XI.M2 for Water Chemistry state that the water chemistry program for PWRs relies on monitoring and control of reactor water chemistry based on industry guidelines such as the Electric Power Research Institute (EPRI) technical reports TR-105714, Rev. 3 and TR-102134, Rev. 3, or later revisions. The latest revisions to these industry guidance documents were published as 1014986, *"Pressurized Water Reactor Primary Water Chemistry Guidelines - Revision 6"*, and 1016555, *"Pressurized Water*

Reactor Secondary Water Chemistry Guidelines - Revision 7". Seabrook Station uses these latest revisions as the bases for the plant water chemistry program, as allowed by NUREG-1801.

Seabrook Station uses a One-Time Inspection Program of selected components at susceptible (low-flow or stagnant) locations to verify the effectiveness of the chemistry control program.

The Water Chemistry Program mitigates the aging effects of loss of material due to general, pitting, and crevice corrosion; cracking due to Stress Corrosion Cracking (SCC); Steam Generator tube degradation caused by intergranular attack (IGA) and outer diameter stress corrosion cracking (ODSCC); and reduction of heat transfer caused by fouling for the internal surfaces of primary and secondary systems by controlling the chemical species that cause the underlying aging mechanisms that result in the aging effects. The chemistry parameters measured are defined and listed in the Seabrook Station Primary and Secondary Water Chemistry Monitoring Programs for all modes of operation. Because it is a mitigation program, the Water Chemistry Program does not detect aging effects directly. However, in selected areas it does monitor for the presence of iron and copper, which could indicate loss of material in some components.

The chemistry parameters, including chlorides, fluorides, dissolved oxygen and sulfate concentrations, are measured utilizing standard proven industry techniques. Water chemistry control is in accordance with EPRI 1014986, "*Pressurized Water Reactor Primary Water Chemistry Guidelines - Revision 6*", for primary water chemistry and EPRI 1016555, *"Pressurized Water Reactor Secondary Water Chemistry Guidelines - Revision 7"*, for secondary water chemistry.

The Seabrook Station Water Chemistry Program establishes the plant water chemistry specifications for chemical species, sampling and analysis frequencies, and corrective actions (e.g., actions levels and responses to out-of-specification water chemistry conditions). This program is administered in accordance with the Seabrook Station Chemistry Manual, including the Seabrook Station Primary Chemistry Control Program and Secondary Chemistry Control Program. These programs and procedures provide the necessary primary and secondary water chemistry controls to minimize contaminant concentrations and to mitigate loss of material due to general, crevice and pitting corrosion and cracking caused by SCC.

PWR Primary Water Chemistry:

The Seabrook Station Primary Chemistry Control Program presents a recommended sampling schedule, species to be analyzed, their limits, and short-term corrective actions for anomalous results for the following systems and components:

a. Reactor Coolant
b. Accumulators
c. Spent Fuel Pool
d. Refueling Canal
e. Demineralized-Water Header
f. Chemical and Volume Control
g. Boric Acid Storage Tanks
h. Refueling Water Storage Tank
i. Reactor Makeup Water Storage Tank
j. Spray Additive Tank

Additionally, the Seabrook Station Primary Chemistry Control Program provides parameter control limits for the respective sample points, as well as appropriate short-term responses to anomalous or out-of-control analysis results. The Primary Water Chemistry procedure follows EPRI water chemistry guidelines in monitoring the concentration of chlorides, fluorides, sulfates, lithium, and dissolved oxygen and hydrogen. One of the objectives of the Primary System Strategic Water Chemistry Plan is contaminant minimization. This objective is implemented through a routine sampling and analysis program, with the data reviewed by personnel at three different levels in the Seabrook organization.

PWR Secondary Water Chemistry:

The Seabrook Station Secondary Chemistry Control Program sets the normal sampling schedule, limits, and corrective actions when limits are exceeded for steam generator blow down, feed water and condensate under power operation, start-up, shutdown, and wet lay-up conditions. This procedure follows EPRI water chemistry guidelines in monitoring secondary plant parameters such as calculated concentration of hydrogen ions (pH) level, cation conductivity, sodium, chloride, sulfate, lead, dissolved oxygen, iron, copper, and hydrazine. The program also includes sampling and control of chemistry parameters for the auxiliary systems such as the Auxiliary Boiler, Demineralized Water and Condensate Storage Tank.

The Seabrook Station Water Chemistry Program specifies the frequency of sampling. Routine primary and secondary system sampling frequencies are specified in station procedures in accordance with EPRI water chemistry guidelines. The Seabrook Station Water Chemistry Program contains guidance on increasing sampling frequency to address an abnormal chemistry condition.

The Seabrook Station Water Chemistry Program contains the acceptance criteria for various contaminants including limits specified in the EPRI water chemistry guidelines. The program also contains the actions to be taken for different levels of the contaminants. Actions to be taken upon reaching each chemistry action level are described in Seabrook Station procedures as required by the EPRI water chemistry guidelines. Evidence of aging effects or unacceptable water chemistry results are evaluated using these procedures and addressed by the Seabrook Station Corrective Action Program.

The Seabrook Station Water Chemistry Program follows the EPRI water chemistry guidelines in identifying actions to be taken and time periods to be imposed when returning parameters found to be outside the specified limits back within the acceptable range. Unexpected and unacceptable chemistry conditions are documented and evaluated in accordance with the Seabrook Station Corrective Action Program.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M2.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Water Chemistry Program is a mitigation program that assures contaminants are maintained below applicable limits to mitigate the aging of plant piping and components. Demonstrations that the aging effects are effectively managed are achieved through objective evidence that shows that cracking, loss of material and reduction of heat transfer are being adequately managed. The following examples of operating experience provide objective evidence that the Seabrook Water Chemistry aging management program will be effective in ensuring that intended functions will be maintained consistent with the current licensing bases for the period of extended operation.

1. In December 2001, Condensate Storage Tank oxygen levels trended upwards, increasing above 75 ppb. Review of the data indicated a potential source of air in-leakage into the Condensate Storage Tank. The Demineralized Water Storage Tanks were verified to have low oxygen levels indicating the condition did not involve Demineralized Water production or storage in the Water Treatment and Demineralized Water systems.

The oxygen levels did not decrease as expected when the Steam Generator Blowdown system was aligned to the ocean and the Condensate Storage Tank was partially refilled several times from the Demineralized Water Storage Tank. As part of the corrective actions; a) the affected portions of the Condensate and Demineralized Water systems were walked down, b) oxygen samples were taken from alternate sample points to validate the samples taken from the Condensate Storage Tank, c) a work order was initiated to inspect the floating seal on the Condensate Storage Tank, d) a work order was initiated to rework the mechanical seal on 1-CO-P-233 (Condensate transfer pump), and e) the affected Condensate system piping was inspected with 1-CO-P-233 shutdown for potential leakage from the mechanical joints. Based on troubleshooting results and samples taken by the Chemistry Department, the Condensate transfer pump1-CO-P-233 was identified as the most likely source for the air in-leakage. Following repair of the mechanical seal on 1-CO-P-233, the Condensate Storage Tank chemistry returned to within Chemistry Program's specifications. This example demonstrates that the Seabrook Station program is able to detect adverse changes in chemistry parameters, identify the source of the condition by the current monitoring and troubleshooting techniques, and correct the condition to return the chemistry parameters to acceptable levels.

2. During Refueling Outage 9 (Fall of 2003) Steam Generator Sludge Analysis results indicated that low or less than detectable concentration of contaminants (e.g. chloride, sulfate, and fluoride) and sulfur were detected by bulk deposit analysis. This detection confirmed that chemistry control was within EPRI Secondary Chemistry Control Guidelines. This example demonstrates the effectiveness of the Secondary Chemistry Control program.

3. In May 2005, during the planned down power for the "A" Main Feedwater Pump lubricating oil strainer work, the control room was notified (at 85% power) that the sodium levels in the Steam Generators were elevated. The Chemistry Department was asked to perform a backup analysis of the Steam Generators and the down power was stopped at the request of the Chemistry Department Supervisor.

   During the down power, the "C" Steam Generator exceeded action level 2 for sodium at approximately 61 ppb. The down power was stopped to determine the reason for the elevated sodium levels and develop a course of action. The reason for the sodium increase was determined to be due to hideout return of the sodium deposited in the Steam Generator crevices from the Moisture Separator Reheater replacement that occurred during Refueling Outage 10 (Spring of 2005). The down power was continued at a rate of 5% per hour after clearing action level 2 to allow continued cleanup of the Steam Generators. Upon completion of the Main Feedwater Pump filter swap, the plant was held at approximately 55% power until all four Steam Generators had cleared action level 1 for sodium. The plant then was returned to full power. The Chemistry Department's discovery of the hideout return was determined to be beneficial in that it allowed cleanup of sodium from the crevices of the Steam Generators. This example demonstrates that the Seabrook Station Water Chemistry program is able to detect and identify the source of the small excursions using the current monitoring and troubleshooting techniques.

4. In May 2005, when placing the Condensate Polishing System demineralizer CPS-DM-35C into service, the Condensate system oxygen level spiked up to 226 ppb by local analyzer indication. Condensate system oxygen level exceeded the action level 2 value of 30 ppb for approximately 38 minutes.

   Chemistry trouble shooting activities identified that the cause of the oxygen spike was inadequate venting of the cation bed after the resin transfer and prior to placing the standby cation bed on recycle. Due to the steps required to ensure complete resin transfer from the cation storage tank (CPS-TK-278) to any of the service vessels (CPS-DM-35 A/B/C), the water in the standby vessel is saturated with air. It was determined that when the Condensate Polisher is first started to support plant startup after an outage, oxygen is not an issue when the condenser vacuum is broken. However, once vacuum is established and the plant is in Mode 1, oxygen intrusion from the Condensate Polishing System directly impacts Condensate system oxygen levels.

   As part of the evaluation of the condition, it was determined that oxygen will be an issue after a resin charge is transferred into its service vessel. The transfer process will introduce air into a service vessel, especially the air mix step to ensure that mixed bed resin is properly mixed in the service vessel. Subsequently, certain steps in the procedures were identified as points in the resin transfer process where oxygen monitoring can occur. Accordingly, procedure changes were implemented into Chemistry and Operations procedures to support oxygen monitoring and to prevent recurrence of this issue.

   Although the Condensate Polishing system is not within the scope of License Renewal, this example demonstrates that the Seabrook Station Chemistry program is able to detect and identify the source of the small excursions and take corrective actions to prevent recurrence using the current monitoring and troubleshooting techniques.

5. In November 2009, a Nuclear Oversight Audit was performed on the Seabrook Station's Chemistry Control Program. The audit included a review

of the Primary and Secondary Chemistry Control Programs. The audit results were as follows:

Primary Water Chemistry:

The audit reviewed Chemistry Department sample results for the following five primary systems:

- Reactor Coolant System
- Reactor Makeup Water Storage Tank
- Boric Acid Storage Tanks
- Safety Injection Accumulators
- Pressurizer Liquid

The audit found that the sample data met the sampling frequency and requirements of the Seabrook Station Chemistry Manual and EPRI Guidelines.

The audit also found that the Chemistry Department, with coordination and support from the Operations Department, continued to maintain control of Reactor Coolant system lithium within tight limits, which results in a stable pH and low Reactor Coolant system corrosion rates.

The audit also reviewed the Chemistry Department efforts to reduce the transport of silica from the Spent Fuel Pool, Reactor Coolant system, and the Refueling Water Storage Tank. The audit determined that Seabrook Station is effectively addressing the Boraflex deterioration in the Spent Fuel Pool, which results in the release of silica to the Reactor Coolant System and Refueling Water Storage Tank during refueling outages. The addition and use of the Silica Removal Skid (CBS-SKD-161) installed during cycle 13, which employs the use of reverse osmosis to remove silica from the Refueling Water Storage Tank, was determined by the audit to have been effectively implemented.

The audit concluded that Primary Chemistry Control met the requirements of the Seabrook Station Chemistry Manual and EPRI Primary Chemistry Control Guidelines.

Secondary Water Chemistry:

The audit reviewed the Chemistry Department sample results for the following six secondary systems:

- Steam Generator Blowdown
- Feedwater System
- Condensate System
- Demineralized Water Storage Tank

- Auxiliary Demineralized Water Storage Tank
- Condensate Storage Tank

The audit found that the sampling frequency and analytical results met the requirements of the Seabrook Station Chemistry Manual and EPRI Secondary Chemistry Control Guidelines.

The audit concluded that the Seabrook Station Chemistry Program minimized corrosion product transport and scale formation in Steam Generators to prevent fouling and additional risk of stress corrosion cracking by controlling secondary system pH. The audit also concluded that volatile amines including Hydrazine (N_2H_4), Methoxypropylamine (MPA) and Ethanolamine (ETA) were added as necessary to control system pH.

The audit concluded that the Secondary Plant Chemistry control was satisfactory.

The operating experiences discussed above include examples of abnormal transients that were identified by routine monitoring activities and corrective actions that were put in place to correct or prevent reoccurrence of such transients in the future. Assessments of the Water Chemistry program are performed to identify the areas that need improvement to maintain the effective performance of the program.

Conclusion

The Seabrook Station Water Chemistry Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.3 REACTOR HEAD CLOSURE STUDS

Program Description

The Seabrook Station Reactor Head Closure Studs Program is an existing program that manages the aging effects of cracking and loss of material in the Reactor Vessel flange stud hole threads, reactor head closure studs, nuts, and washers per the requirements of ASME Section XI, *"Rules for Inservice Inspection of Nuclear Power Plant Components"*. The Seabrook Station program implements the requirements of ASME Section XI code as described in the Seabrook Station ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. Seabrook Station implements the guidance outlined in Regulatory Guidance (RG) 1.65, *"Material and Inspection for*

Reactor Vessel Closure Studs", for preventive measures. These preventive measures include material selection, appropriate coatings, and lubricants.

Potential cracking and loss of material in Reactor Vessel flange stud hole threads, reactor head closure studs, nuts, and washers are detected through visual or volumetric examinations in accordance with ASME Section XI requirements. These inspections are conducted during refueling outages while the vessel studs are removed. Studs, nuts, and washers are stored in protective racks after removal. Reactor Vessel flange holes are plugged with water tight plugs during cavity flooding. These methods assure the holes, studs, nuts, and washers are protected from borated water during cavity flooding.

The reactor flange and head are sealed by two metallic O-rings. Leak-off connections are provided between the O-rings and beyond the outer O-ring. Reactor Vessel flange leakage is monitored prior to reactor startup during Reactor Coolant system pressure testing each refueling outage. Following reactor startup, any flange leakage is piped to the Reactor Coolant Drain Tank. A high temperature indication in the piping indicates Reactor Coolant leakage.

Seabrook Station follows ASME Subsection IWB, Examination Category B-G-1 for pressure retaining bolting greater than 2 inches in diameter. The appropriate examinations, as specified in ASME Section XI, Table IWB-2500-1 and Code Case N307-3, *"Ultrasonic Examination of Class 1 Bolting, Table IWB-2500-1, Examination Category B-G-1 Section XI, Division 1,"* are used to manage the aging effects of loss of material due to corrosion or wear, crack initiation and crack growth due to stress corrosion and intergranular stress corrosion cracking on the reactor head closure components.

Seabrook Station uses ASME Section XI Table IWB 2500, Examination Category B-P visual (VT-2) inspections during pressure testing to detect leakage from the Reactor Vessel head to vessel interface.

Seabrook Station implements the guidance outlined in RG 1.65 for preventive measures. These preventive measures include material selection and use of appropriate coatings and lubricants. Seabrook Station has 54 reactor head closure studs and 54 spare studs. All are manufactured from SA-540, Class 3, Grade B24 material UFSAR Table 5.2-2). The maximum tensile strength is less than 170 ksi (UFSAR Section 1.8). The reactor head closure studs are coated with an anti-galling compound (PlasmaBond) and a station approved lubricant is utilized during installation/removal of the studs that do not contain molybdenum disulfide (MoS_2).

The Seabrook Reactor Head Closure Studs Program schedules and performs inspections to insure that degradation of vessel flange stud hole threads, closure studs, nuts, and washers is discovered before loss of intended function. The program utilizes visual and volumetric examinations in accordance with the general requirements of Subsection IWA-2000 of ASME Section XI to detect the presence of surface discontinuities, flaws, cracking and loss of material by corrosion or wear. The frequency of the inspections is in accordance with the requirements of ASME Section XI, Table IWB-2500-1, Examination Category B-G-1. Seabrook Station does not have bushings on the reactor head studs.

Reactor closure head studs are removed from the Reactor Vessel each refueling outage. ASME Section XI Inservice Inspection examinations are performed with the studs removed and consist of a volumetric examination in accordance with Code Case N-307-3. The Code Case states that when conducting ultrasonic examinations from the end of the stud or from the center-drilled hole to satisfy the requirements of Table IWB-2500-1, the surface examination requirement of the table (Item No. B6.30) may be eliminated. The Reactor Vessel threads in the flange (Table IWB-2500-1 Item B6.40) are inspected by volumetric examination. The closure head nuts and washers are inspected by visual, VT-1, examination.

The Seabrook Station inspection schedule provides for timely detection of cracks, loss of material, and leakage. The program complies with the schedule requirements of ASME Section XI, IWB-2400, Inspection Program B, and the extent and frequency of Table IWB-2500-1.

The Seabrook Station program requires that any indication or relevant condition of degradation in the Reactor Vessel flange stud holes or the closure stud bolting is evaluated in accordance with IWB-3100 by comparing the inspection results with the acceptance standards of IWB-3400 and IWB-3500.

Repairs and replacements are performed in accordance with the requirements of ASME Section XI as identified in Seabrook Station ASME Section XI Repair and Replacement Program and the material and inspection guidance of RG 1.65. NUREG-1801 specifies that repair and replacement should be performed in accordance with the requirements of IWB-4000 and IWB-7000, respectively. Sections IWB-4000 and IWB-7000 no longer exist in ASME Section XI. The applicable repair and replacement guidance in the 1995 edition of ASME Section XI is contained in Section IWA-4000. The Seabrook Station does not consider this to be an exception to NUREG-1801.

NUREG-1801 Consistency

NUREG-1801, Rev 1, discusses the use of the 2001 edition including the 2002 and 2003 addenda of ASME Section XI code, but allows use of other editions of the ASME Code as long as there is justification. The Seabrook Station Inservice Inspection Program Plan for the second ten-year inspection interval effective from August 19, 2000 through August 18, 2010, approved per 10 CFR 50.55a, is based on the 1995 edition including the 1996 addenda. The next and subsequent 120-month inspection intervals for Seabrook Station will incorporate the requirements specified in the version of the ASME Code incorporated into 10 CFR 50.55a twelve months before the start of the inspection interval.

This program, with the exception noted below, is consistent with NUREG-1801 XI.M3.

Exceptions to NUREG-1801

1. NUREG-1801 XI.M3 states *"Components are examined and tested as specified in Table IWB-2500-1. Examination category B-G-1 for pressure-retaining bolting greater than 2 in. diameter in reactor vessels specifies volumetric examination of studs in place, from the top of the nut to the bottom of the flange hole, and surface and volumetric examination of studs when removed".*

   At Seabrook Station, the reactor closure head studs are removed from the Reactor Vessel during each refueling outage. ASME Section XI Inservice Inspections are performed with the studs removed and consist of a volumetric examination only as allowed by Code Case N-307-3, *"Ultrasonic Examination of Class 1 Bolting, Table IWB-2500-1, Examination Category B-G-1 Section XI, Division 1"*, and current version of the ASME Section XI Code.

   <u>Justification for the Exception</u>

   The Generic Aging Lessons Learned (GALL) aging management program inspection requirements for Reactor Head Closure Studs are based the ASME Section XI Code requirements. NUREG 1801, Revision 0 requirements were based on Table IWB 2500-1 of the 1995 Edition through the 1996 addenda of the ASME Code, Section XI. This code edition included requirements for surface and volumetric examination of reactor head closure studs when removed. The later version of the code now endorsed by NUREG 1801, Revision 1 program (2001 edition including the 2002 and 2003 addenda) has been updated to include the Code Case N-307-3 allowance not to require surface examination when studs are removed. However, the detection of aging effects section of

NUREG 1801 Revision 1 for this program still makes reference to the "*surface*" examination as a requirement from the 1995 edition with 1996 addenda of the ASME Section XI Code.

The Seabrook Station Inservice Inspection Program Plan for the second ten-year inspection interval effective from August 19, 2000 through August 18, 2010, approved per 10 CFR 50.55a, is based on the 1995 edition including the 1996 addenda of the ASME Section XI Code including the provisions of Code Case N-307-3. As allowed under the Code Case, Seabrook Station no longer performs surface examinations and only performs volumetric examination of the reactor head closure studs when removed.

Program Elements Affected: Element 4 (Detection of Aging Effects).

Enhancements

None

Operating Experience

Review of plant-specific operating experience has not revealed any cases of cracking or wear with the Seabrook Station Reactor Vessel studs, nuts, flange stud holes, or washers.

The Inservice Inspection Program at Seabrook Station is updated to account for industry operating experience. ASME Section XI is also revised every three years and addenda issued in the interim, which allows the code to be updated to reflect operating experience. The requirement to update the Inservice Inspection Program to reference more recent editions of ASME Section XI at the end of each inspection interval ensures the Inservice Inspection Program reflects enhancements due to operating experience that have been incorporated into ASME Section XI.

1. During Refueling Outage 5 (Spring of 1997), Seabrook Station experienced one stuck reactor head closure stud. This stud was cut out and appropriate ASME Section XI repairs/retests completed. The condition was attributed to galling, which prompted an investigation into suitable anti-galling compounds. In 2000, a spare set of reactor head closure studs were coated with a nickel-silver palladium anti-galling compound. This coating process was initially developed by Westinghouse and Texas Utilities under the name of PlasmaBond (formerly known as MagIon). The coating process has been successfully used at other nuclear power plants. The PlasmaBond process was qualified for use at Seabrook Station by an Engineering Change document. A pre-service inspection of these studs (ultrasonic and magnetic particle testing) was performed in accordance with

ASME Section XI prior to coating. During Refueling Outage 7 (Fall of 2000), the Seabrook Station reactor head closure studs were replaced with the PlasmaBond coated studs. The studs removed were also coated using the PlasmaBond process and stored as spares. These spare reactor head closure studs were installed during Refueling Outage 13 (Fall of 2009) as part of a periodic replacement of the PlasmaBond coated reactor head studs. This example demonstrates that the Plasmabond coating has been successful as an anti-galling treatment and has not adversely affected the stud function.

2. During Refueling Outage 8 (Spring of 2002), during Reactor Vessel disassembly, a condition report was generated when the workers reported difficulty in removing the reactor head closure studs compared to previous outages. Discoloration was also reported on some of the studs. Subsequent inspections did not indicate any thread damage on any of the studs. The discoloration on the PlasmaBond coating was determined to be the lubricant used for stud removal and was considered to be normal and not an indication of a degraded condition. Further evaluation and resolution of this issue resulted in: a) purchase of a new stud removal tool, b) revision to the Maintenance procedures to provide better direction to ensure that the studs are protected from damage during installation and removal, and c) development of a new maintenance procedure for inspection of the PlasmaBond coating on the reactor closure head studs.

3. During Refueling Outage 10 (Spring of 2005), while performing verification of the final elongation values of the reactor head studs, a condition report was initiated, which identified that Stud No. 30 was out of specified elongation range by 0.002 inches. The acceptance values for final elongation of the studs post tensioning were from 0.049 inches to 0.056 inches. Stud No. 30 was found to be tensioned to an elongation of 0.047 inches. Subsequently, an engineering evaluation was performed. This evaluation concluded that the preload induced by the post tensioned final elongation value of 0.047 inches for Stud No. 30 was more than adequate to carry the Reactor Vessel pressure design loads. This condition did not alter the original design intent or the function of the stud to maintain Reactor Coolant system pressure boundary and structural integrity of the reactor head and flange connection for all service conditions.

4. The Seabrook Station Reactor Vessel studs, nuts and washers are 100% ultrasonically inspected once every Inservice Inspection ten year interval. The ultrasonic inspections of the 54 studs were divided up between the scheduled refueling outages during the ten year interval. During Refueling Outage 13 (Fall of 2009), which was the last scheduled outage for the second ten year interval, the final 9 of the 54 studs were ultrasonically

inspected with acceptable results. No unacceptable results have been identified through these inspections.

The operating experience of the Reactor Head Closure Studs Program shows that there are no signs of age related degradation. The above examples provide objective evidence that any anomalies or deficiencies are entered into the corrective action process, the conditions are evaluated, and corrective actions are taken when necessary to prevent recurrence.

Conclusion

The Seabrook Station Reactor Head Closure Studs Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.4 BORIC ACID CORROSION

Program Description

The Seabrook Station Boric Acid Corrosion Program is an existing program that manages the aging effects of loss of material in mechanical, electrical, and structural components due to leakage from systems containing borated water. The Seabrook Station Boric Acid Corrosion Program implements the recommendations of NRC Generic Letter (GL) 88-05, *"Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants"*. Degradation of the component due to boric acid corrosion can not occur without leakage of borated water. Therefore, the program requires periodic visual inspection of all systems within the scope of license renewal that contain borated water for evidence of leakage, accumulations of dried boric acid, or boric acid wastage. The scope of this program includes sources of borated water leakage that are outside the scope of GL 88-05 but are in proximity to structures and components that are subject to aging management review. The program provides for visual inspections and early discovery of borated water leaks such that mechanical, electrical, and structural components that may be contacted by leaking borated water will not be adversely affected or their intended functions impaired.

The Boric Acid Corrosion Program includes provisions for identification of components exhibiting boric acid accumulations or leakage, evaluation of the acceptability for continued service of components exhibiting boric acid accumulations or leakage, trending and tracking of previously identified leaks or boric acid accumulations, and taking appropriate corrective actions.

As part of the Boric Acid Corrosion Program, Seabrook Station monitors operating experience related to boric acid leaks and takes appropriate corrective actions. By conducting visual inspections, locating the source of the leaks when they are discovered, performing engineering evaluations, and reviewing internal and external operating experience, the program ensures that Structures, Systems and Components (SSCs) within the scope of license renewal will continue to perform their intended functions.

Loss of material by boric acid wastage is also discussed for the Reactor Vessel (RV) head by the Nickel-Alloy Penetration Nozzles Welded to the Upper RV Closure Heads of PWRs Program, B.2.1.5, and for the Reactor Head closure studs by the Reactor Head Closure Studs Program, B.2.1.3.

The Seabrook Station Boric Acid Corrosion program includes requirements for:

a. monitoring of borated water systems for boric acid leakage,

b. visual inspections of mechanical, electrical, and structural component surfaces that are potentially exposed to borated water leakage,

c. inspections for boric acid leakage during pressure testing,

d. timely discovery of the principal location of the leak, the leakage pathway, and extent of condition,

e. removal of boric acid residue,

f. assessment of the corrosion and evaluation of the effects of leakage and corrosion on components in a timely manner to maintain component integrity, and

g. follow-up inspection for adequacy of corrective actions.

Preventive actions include improving maintenance practices such as revising the valve packing program to improve packing design and techniques, performance of periodic walk downs and leakage surveillances to identify components that may require corrective maintenance, and monitoring locations where potential leakage could occur. Timely repair of detected leakage prevents or mitigates boric acid corrosion, and is accomplished in accordance with the program's corrective action process.

The program relies on visual inspections conducted during normal plant operation and when the plant is shutdown for refueling. Visual inspections include both focused inspections and observations by plant personnel during normal operational activities. Personnel in the plant look for boric acid residue as a white crystal-like substance or any discoloration or moisture. The program follows the guidelines in NRC GL 88-05 and provides for timely detection of leakage during pressure testing or by observance of boric acid crystal deposits during plant walkdowns and maintenance.

The Seabrook Station program includes trending of boric acid leaks and status for adverse conditions.

The Seabrook Station program acceptance criterion requires corrective actions and/or further evaluation if any leakage or residue of boric acid is observed. The Seabrook Station maintenance procedure for cleaning and inspection of components subjected to boric acid leakage provides direction for performing initial screening inspection, cleaning and follow-up inspection of components identified as boric acid leaking components. Engineering evaluation of boric acid leakage effects on structures and components are performed per a Seabrook Station procedure to ensure that the intended functions of the affected structures and components remains consistent with the design basis.

When boric acid leaks are discovered, they are entered into the Corrective Action Program, evaluated, and are corrected through the corrective maintenance process. This approach ensures that identified problems are corrected and that component aging related to boric acid corrosion is effectively managed.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M10.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Industry operating experience indicates that boric acid leaks can cause significant corrosion damage to susceptible plant structures and components. Program effectiveness reviews and self assessments of the boric acid corrosion program identify the areas that need improvement to maintain the quality of the program. Performance indicators for the Boric Acid Corrosion Program show that the program is compliant with existing regulations and will be able to manage boric acid corrosion during the period of extended operation.

1. In August 2005, Institute of Nuclear Power Operations (INPO) conducted a Primary Systems Review at Seabrook Station. This review noted a large boric acid leakage backlog of work orders related to boric acid leakage. Subsequent INPO mid-term and scheduled evaluation and assessment

visits noted a continuing growth in the backlog. Subsequently, Seabrook Station conducted benchmarking visits of INPO-recommended programs. These visits identified common methods that had proved effective in addressing boric acid leaks. Many of these methods were incorporated into the Seabrook Station Boric Acid Corrosion Program. These changes reduced the significant work order backlog from several hundred to less than twenty within one operating cycle.

2. Several Seabrook Station condition reports document the effectiveness of the Boric Acid Corrosion Program. Through field observations, the condition reports document that when a boric acid deposit is observed, it is promptly reported, evaluated, and repaired. One example is the discovery of boric acid residue on a Chemical and Volume Control system valve (CS-V-158) during a plant walkdown in 2008. The valve was categorized as an active leak per the Boric Acid Corrosion Program. The boric acid leakage was evaluated and the packing leak was repaired to eliminate the leakage. Another example is the discovery of medium boric acid buildup on a Residual Heat Removal system valve (RH-V-15), in 2005, during ASME Section XI Inservice Inspection of the Residual Heat Removal system. The dry boric acid build up was at the body to bonnet joint on the valve. The boric acid leakage was evaluated per the Seabrook Station Boric Acid Corrosion Program and the body to bonnet gasket was replaced to eliminate the leakage.

3. In November 2008, a self-assessment of the Boric Acid Corrosion Program was performed. This self-assessment compared the Seabrook Station Boric Acid Corrosion Program against the current industry guidance document, which is WCAP-15988-NP, Revision 1, *"Generic Guidance for an Effective Boric Acid Inspection Program for Pressurized Water Reactors"*. This WCAP was issued in February 2005 and identifies potential enhancements to the Boric Acid Corrosion Programs described in the utility responses to the GL 88-05.

   Using the eleven Westinghouse Commercial Atomic Power (WCAP) objectives, the Seabrook Station Boric Acid Corrosion Program was assessed. This self-assessment identified the process as operationally sound and in a mode of continuous improvement. Enhancements were identified that would more closely align the Seabrook Station Boric Acid Corrosion Program to the guidance document. The self-assessment identified that the Seabrook Boric Acid Corrosion Program could benefit by being more prescriptive in addressing some of the WCAP objectives. Four condition reports were generated during the course of this Self Assessment. None of these condition reports identified programmatic failures and all were directed towards future boric acid program enhancements.

These examples provide objective evidence that appropriate guidance exists for identification, evaluation, and repair/replacement of locations where boric acid deposits are observed. Assessments of the Boric Acid Corrosion Program are performed to identify the areas that need improvement to maintain the effective performance of the program.

Conclusion

The Seabrook Station Boric Acid Corrosion Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis during the period of extended operation.

B.2.1.5 NICKEL-ALLOY PENETRATION NOZZLES WELDED TO THE UPPER REACTOR VESSEL CLOSURE HEADS OF PRESSURIZED WATER REACTORS

Program Description

The Seabrook Station Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program is an existing program that is part of the Inservice Inspection program and manages the aging effects of cracking due to primary water stress corrosion cracking in the reactor coolant environment. This program was established to ensure that augmented In-Service Inspections of all nickel-alloy penetration nozzles welded to the upper Reactor Vessel head will continue to be performed as mandated by the latest requirements. The original program requirements were contained in NRC Order EA-03-009, *"Issuance of Order Establishing Interim Inspection Requirements for Reactor Vessel Heads at Pressurized Water Reactors"*, as amended by the First Revision of the Order. The GALL program incorporates any subsequent NRC requirements that may be established to supersede the requirements of NRC Order EA-03-009. On September 10, 2008, the NRC revoked Order EA-3-009 and replaced it with ASME Code Case N-729-1, "*Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds, Section XI, Division 1, Supp 4,*" as modified in 10 CFR 50.55a (g)(6)(ii)(D). Therefore, the NRC requirements contained in 10 CFR 50.55a (g)(6)(ii)(D) are the currently applicable NUREG-1801 aging management program for nickel-alloy penetration nozzles welded to the upper RV closure heads of PWRs.

The program is focused on managing the effects of cracking due to primary water stress corrosion cracking of the nickel-alloy used in the fabrication of the upper vessel head penetration nozzles.

The program monitors for cracking due to primary water stress corrosion cracking and loss of material due to boric acid corrosion in the upper vessel head penetration nozzles to ensure that flaw indications are detected prior to loss of their intended safety function and prior to any challenge to the structural integrity of the nozzles. The program also monitors for evidence of Reactor Coolant system leakage as a result of through-wall cracks that may exist in the upper vessel head penetration nozzles or their associated partial penetration J-groove welds. The Seabrook Station inspections include bare metal visual inspections of 100% of the Reactor Vessel head surface and ultrasonic testing of each Reactor Vessel head penetration nozzle on a frequency prescribed by ASME Code Case N-729-1, as modified in 10 CFR 50.55a.

Inspections in accordance with EA-03-009 or the First Revision to the Order have been completed during Refueling Outage 8 (Spring of 2002), Refueling Outage 9 (Fall of 2003), and Refueling Outage 11 (Fall of 2006). No degradation of Reactor Vessel head penetration nozzles has been discovered during these inspections. Based on degradation-free inspection results, ASME Code Case ranking and operating schedule, the next inspection is scheduled for Refueling Outage 14 (Spring of 2011), and will be performed in accordance with ASME Code Case N-729-1, as modified in 10 CFR 50.55a (g)(6)(ii)(D).

The Seabrook Station program meets the requirements of the ASME Code Case N-729-1, as modified in 10 CFR 50.55a, and is included as part of the Seabrook Station Reference Manual - RCS Materials Degradation Management Reference. The Seabrook Station Reactor Vessel head penetrations are Alloy 600 and include one (1) penetration for the top head vent and seventy-eight (78) penetrations for control rod drives and instrumentation. Initial evaluations performed in accordance with NRC Order EA-03-009 determined that Seabrook Station fell into the low susceptibility category for primary water stress corrosion cracking. ASME Code Case N-729-1, as modified in 10 CFR 50.55a, requires calculations for Effective Degradation Years (EDY) and Re-Inspection Years (RIY). These numbers are used as a basis for determining inspection frequency. Seabrook Station has a current value for EDY of 3.03 and the RIY value is 0.95 at the end of cycle 13 which ended in the fall of 2009. In accordance with Table 1, including note (4) of ASME Code Case N-729-1, as modified in 10 CFR 50.55a, these values result in an re-inspection frequency for visual exams of every third refueling outage or 5 calendar years, and for volumetric examinations of every 8 calendar years.

The Seabrook Station Water Chemistry Program (B.2.1.2) is credited as a preventive measure to mitigate primary water stress corrosion cracking.

Repair, replacement, and mitigation activities are conducted in accordance with the Seabrook Station ASME Section XI Repair/Replacement program.

If flaw indications attributed to primary water stress corrosion cracking are identified, whether acceptable or not for continued service under paragraphs 3130 or 3140 of ASME Code Case N-729-1, as modified in 10 CFR 50.55a, the re-inspection frequency must be increased to each refueling outage instead of the re-inspection intervals in accordance with Table 1, note (8) of ASME Code Case N-729-1, as modified in 10 CFR 50.55a.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M11A.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Seabrook Station has not detected primary water stress corrosion cracking in the Reactor Vessel head penetration nozzles and J-groove welds of the Reactor Vessel closure head penetrations. Several inspections have been performed and no evidence of degradation of the vessel head penetration nozzles and J-groove welds was found. A summary of these inspection results from the past refueling outages is listed below.

1. During Refueling Outage 8 (Spring of 2002), a bare metal visual inspection of the Reactor Vessel top head was performed. The robotic inspection provided a 360° view of each penetration and adjacent surfaces. No evidence of penetration leakage was observed.

2. During Refueling Outage 9 (Fall of 2003), a control rod drive mechanism canopy seal weld leak was discovered by evidence of boric acid on the Reactor Vessel head flange during Reactor Vessel disassembly. An under insulation inspection was conducted and another canopy seal weld leak was discovered. Subsequently, the boric acid deposits were removed and the Reactor Vessel head was inspected. No underlying corrosion was found. The remaining control rod drive mechanism canopy seal welds were also inspected and no additional leaks were discovered and no evidence of penetration leakage was observed. The evaluation of the condition determined that the canopy seal weld failure mechanism was transgranular stress corrosion cracking due to the presence of halogen species, most likely chloride, in combination with oxygen. These types of canopy seal weld leaks had been previously observed in other PWRs. Approximately forty-six canopy seal weld leaks had been reported in the industry as of

October of 2003. The canopy seal weld is a non-structural weld that provides a seal to prevent Reactor Coolant leakage onto the Reactor Vessel head. During Refueling Outage 9, these two leaks were repaired by the installation of canopy seal clamp assemblies. The canopy seal clamp assembly is a mechanical device that seals the leaking weld by introducing a compressive load into the weld to close the crack and precludes further flaw propagation. This repair developed by Westinghouse is considered a permanent fix.

Follow up inspections were performed during Refueling Outage 10 (Spring of 2005) and again during Refueling Outage 11 (Fall of 2006), and no additional canopy seal weld leaks were identified.

3. During Refueling Outage 11 (Fall of 2006), the Reactor Vessel head inspections were conducted as required by First Revised NRC Order EA-03-009. The inspections included a robotic bare metal visual inspection of each penetration and head surface from the top. A robotic inspection of J-Groove welds and penetration tubes from the underside of the head was performed using ultrasonic and surface examination techniques. No unacceptable indications were discovered.

   The next scheduled bare metal visual inspection of the Reactor Vessel top head penetrations is scheduled for Refueling Outage 14 (Spring of 2011).

The review of operating experience provides objective evidence that the closure head components are in good condition and that the Nickel-Alloy Penetration Nozzles Welded to the Upper RV Closure Heads of PWRs Program is effective in detecting any flaw indications prior to the loss of intended function. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found.

Conclusion

The Seabrook Station Nickel-Alloy Penetration Nozzles Welded to the Upper RV Closure Heads of PWRs Program provides reasonable assurance that the aging effects will be will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.6 THERMAL AGING EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL (CASS)

This program is not used at Seabrook Station. The Seabrook Station Reactor Coolant system contains statically cast fittings constructed of SA-351 Grade CF8A material in a service condition greater than 482°F. However, the aging effect in NUREG-1801 for this material and environment combination is not applicable because the molybdenum and ferrite contents for these components are below the industry accepted threshold (<0.5% molybdenum and <20% ferrite). Therefore, loss of fracture toughness due to thermal aging embrittlement is not applicable.

B.2.1.7 PWR VESSEL INTERNALS

Program Description

The Seabrook Station PWR Vessel lnternals Program is a new program that will manage the aging effects of crack initiation and growth due to irradiation-assisted stress corrosion cracking, primary water stress corrosion cracking and stress corrosion cracking; reduction of fracture toughness due to radiation and thermal embrittlement and void swelling; changes in dimensions due to void swelling; and loss of preload due to stress relaxation, in Reactor Vessel Internals components.

The Seabrook Station PWR Vessel Internals Program will be based on inspection guidance provided in MRP-227 Rev. 0, *“Material Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines”* and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. MRP-227 is based upon industry operating experience, research data, and vendor evaluations. The examination methods, coverage, and schedule prescribed in MRP-227 account for aging experience in both domestic and international Reactor Vessel Internals.

Industry operating experience related to the aging degradation of PWR Vessel Internals is described in the Operating Experience program element. The Seabrook Station PWR Vessel Internals Program will continue to evolve as additional inspection experience is gained through FPL/NextEra participation in EPRI material reliability program activities.

The Seabrook Station PWR Vessel Internals aging management will consist of four major elements: (1) component categorization and aging management strategy development; (2) selection of aging management methodologies for vessel internals that are both appropriate and based on an adequate level of applicable experience; (3) qualification of the recommended methodologies that is based on adequate technical justification; and (4) implementation of the recommendations based on the Industry Initiative for the Management of Materials Issues, NEI Guideline, 03-08.

<u>Program Elements</u>

The following provides the results of the evaluation of each program element against the 10 elements described in Appendix A of NUREG-1800 Rev. 1, *"Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants".*

Element 1 - Scope of Program

The Seabrook Station PWR Vessel lnternals Program addresses the management of aging effects of the Seabrook Station Reactor Vessel internals components, both non-bolted and bolted. The Seabrook Station Reactor Vessel internals consist of two basic assemblies, the upper internals assembly that is removed during each refueling operation to obtain access to the reactor core, and the lower internals assembly that can be removed, if desired, following a complete core off-load.

The scope does not include fuel assemblies, control rod drive assemblies, nuclear instrumentation, and welded attachments. Fuel assemblies are periodically replaced (i.e., short lived), and therefore, are not subject to aging management review. Control rod drive assemblies are active components and therefore, are not subject to aging management review. Nuclear Instrumentation (i.e., incore neutron flux detectors) are active electrical components, and therefore, are not subject to aging management review. The scope also does not include welded attachments to the Reactor Vessel. Welded attachments to the Reactor Vessel interior are subject to examination in accordance with the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, B.2.1.1. The IWB, IWC, and IWD Program conducts visual inspection of the accessible interior attachment welds per ASME Section XI, Table IWB-2500-1, examination category B-N-2, Welded Core Support Structures and Interior Attachments to Reactor Vessels.

The Seabrook Station PWR Vessel lnternals Program will be focused on managing crack initiation and growth due to irradiation-assisted stress corrosion cracking, primary water stress corrosion cracking and stress corrosion cracking; reduction of fracture toughness due to radiation and thermal embrittlement and void swelling; changes in dimensions due to void swelling; and loss of preload due to stress relaxation, in Reactor Vessel internals components. Loss of fracture toughness due to radiation and thermal embrittlement is of consequence only if cracks exist and the local applied stress intensity exceeds the reduced fracture toughness. Cracking, if it occurs, is expected to initiate at the surface and is detectable by the augmented inspections performed under this program.

The Seabrook Station PWR Vessels Internals Program complies with NRC guidance and includes the following commitments:

1. A PWR Vessel Internals Program will be implemented, prior to period of extended operation, as described in this section.

2. An inspection plan for Reactor Vessel Internals will be submitted for NRC review and approval at least twenty-four months prior to entering the period of extended operation.

This submittal will include any necessary revisions to the Seabrook Station PWR Vessel Internals Program, as well as any related changes to the Seabrook Station scoping, screening, and aging management review results for PWR Vessel Internals, to conform to the NRC approved inspection and evaluation guidelines.

MRP-227 inspection and evaluation guidelines were organized around a framework and strategy for managing the effects of aging in PWR internals together with a substantial database of material data and supporting results. This process permitted further categorization of PWR vessel internals into the functional groups that follow:

a. *Primary:* Those PWR vessel internals that are highly susceptible to the effects of at least one of the aging mechanisms were placed in the Primary group. The aging management requirements that are needed to ensure functionality of Primary components are described in MRP-227.

b. *Expansion:* Those PWR vessel internals that are highly or moderately susceptible to the effects of at least one of the aging mechanisms, but for which functionality assessment has shown a degree of tolerance to those effects, were placed in the Expansion group.

c. *Existing Programs:* Those PWR vessel internals that are susceptible to the effects of at least one of the aging mechanisms, and for which generic and plant-specific existing aging management program requirements are capable of managing those aging effects, were placed in the Existing Programs group.

d. *No Additional Measures:* Those PWR vessel internals for which the effects of all aging mechanisms are below the screening criteria were placed in the No Additional Measures group. No further action is required by MRP-227 for managing the aging of the No Additional Measures components.

This categorization process does not supersede the ASME Section XI Inservice Inspection requirements.

<u>Element 2 - Preventive Actions</u>

The Seabrook Station PWR Vessel Internals Program will be a condition monitoring program and does not include any preventive or mitigative actions. Preventive and mitigative actions for the Reactor Vessel Internals components are established and implemented in accordance with the

Seabrook Station Water Chemistry Program described in B.2.1.2. The Water Chemistry Program manages aging effects by controlling concentrations of known detrimental chemical species, such as chlorides, fluorides, sulfates and dissolved oxygen, below the levels known to cause degradation. The program includes specifications for chemical species, sampling and analysis frequencies, and corrective actions for control of water chemistry.

Element 3 - Parameters Monitored/Inspected

The Seabrook Station PWR Vessel lnternals Program will monitor the effects of aging related degradation mechanisms on the intended function of Reactor Vessel Internals components through one-time, periodic, and conditional examinations, and other aging management program methodologies, as needed, in accordance with the MRP-227 and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. This program will be credited for managing cracking due to irradiation-assisted stress corrosion cracking, primary water stress corrosion cracking and stress corrosion cracking; reduction of fracture toughness due to radiation and thermal embrittlement and void swelling; changes in dimensions due to void swelling and loss of preload due to stress relaxation in PWR Vessel Internals components.

The Seabrook Station PWR Vessel lnternals Program aging management methodologies will include visual examinations, surface examinations, volumetric examinations, and physical measurements. VT-3 visual examinations detect the general degradation conditions, whereas VT-1 visual and enhanced EVT-1 visual examinations will be conducted to detect discontinuities and imperfections on the surface of components. Surface examinations will characterize discontinuities on the surface of components, and the volumetric inspections will indicate the presence of discontinuities or flaws throughout the volume of material. Aging effects may involve changes in clearances, settings, and physical displacements that will be monitored by visual means or physical measurements.

Once per Inservice Inspection interval, the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program requires a VT-3 visual examination of the Reactor Vessel removable core support structures in accordance with Table IWB-2500-1, Examination Category B-N-3.

The inspection and test techniques prescribed by the ASME Code, Section XI and augmented by MRP-227 are designed to maintain structural integrity by ensuring the aging effects will be detected and corrective actions taken, before the loss of intended function of the Seabrook Station Reactor Vessel Internals.

Element 4 - Detection of Aging Effects

Inspection and evaluation to manage aging of Reactor Vessel Internals will consist of the following:

a. selection of items for aging management

b. selection of the type of examination or other methodologies appropriate for each applicable degradation mechanism

c. specification of the required level of examination qualification

d. schedule of first examination and frequency of any subsequent examinations

e. sampling and coverage

f. expansion of scope if sufficient evidence of degradation is observed;

g. examination acceptance criteria

h. methods for evaluating examination results not meeting the examination acceptance criteria

i. updating the program based on industry-wide results, and

j. contingency measures to repair, replace, or mitigate

The Seabrook Station PWR Vessel Internals Program will use visual inspection, surface examination and volumetric inspection techniques to manage the applicable effects of aging. Aging management methodologies described in MRP-227 are based on either existing inservice examinations required by the ASME Code, Section XI or on well-documented and well-demonstrated examination methods with which the industry has considerable experience. The inspection techniques are described below:

a. VT-3 visual examinations will be conducted to determine the general mechanical and structural condition of components by detecting discontinuities and imperfections, such as loss of integrity at bolted or welded connections, loose or missing parts, debris, or corrosion; and by identifying conditions that could affect operational or functional adequacy of components. VT-3 visual examinations of internals will be conducted using remote examination techniques, due to personnel radiation exposure issues.

b. The VT-1 visual examination and the enhanced EVT-1 visual examination will be utilized where a greater degree of detection capability than VT-3 visual examination is needed to manage the aging effect. Unlike the detection of general degradation conditions by VT-3 visual examination, VT-1 visual and enhanced EVT-1 visual examinations will be conducted to detect discontinuities and imperfections on the surface of components, including such conditions as cracks, corrosion, or erosion.

c. Surface examination may be used to supplement either VT-3 visual or VT-1/EVT-1 visual examinations, in order to further characterize discontinuities on the surface of components. This supplemental examination may thus be used to reject or accept relevant indications. A surface examination is an examination that indicates the presence of surface discontinuities. Surface examinations may be conducted using the eddy current (ET) inspection method.

d. An ultrasonic examination will be utilized where visual or surface examination is unable to detect the effect of the age-related degradation for some PWR vessel internals. The ultrasonic examination detects the presence of discontinuities or flaws throughout the volume of material.

e. Physical measurements, in some cases, can manage the loss of preload or clamping force caused by thermal and irradiation-enhanced stress relaxation, and excessive distortion or deflection caused by void swelling. These aging effects may involve changes in clearances, settings, and physical displacements that can be monitored by visual means, supplemented by physical measurements that characterize the magnitude of the effects. This methodology may be used in conjunction with VT-3 visual examination, which includes verifying parameters, such as clearances, settings, and physical displacements.

Components designated as having no significant aging effects will require no additional measures for future inspections other than the ASME Code inspections per Section XI, Examination Category B-N-3, for removable internal structures. Once per Inservice Inspection interval the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program conducts a VT-3 visual examination of the Reactor Vessel removable core support structures under Table IWB-2500-1, Examination Category B-N-3.

Documentation of inspection results associated with the PWR Vessel Internals Program will be in accordance with approved inspection procedures. All necessary program implementing documents, including inspection procedures, will be developed in accordance with the FPL/NextEra Energy Quality Assurance Program which implements the requirement of 10 CFR Part 50, Appendix B. The inspections will be performed by qualified personnel following procedures consistent with the ASME Code and 10 CFR Part 50, Appendix B.

Examination methods, coverage, and schedule of the inspections prescribed by ASME Section XI and MRP-227 are intended to maintain structural integrity by ensuring the aging effects will be detected and corrective actions taken, before the loss of intended function of the Seabrook Station Reactor Vessel Internals.

FPL/NextEra Energy participates in the industry programs for investigating and managing aging effects on reactor internals. The program will implement applicable results of the industry programs.

Element 5 - Monitoring and Trending

Implementation of one-time, periodic, and conditional examinations and other aging management methodologies, scheduled in accordance with the ASME Section XI and MRP-227 will provide timely detection of aging effects. In addition to the primary components, program expansion components have been defined should the scope of examination and re-examination need to be expanded beyond the primary group due to detection of significant aging effects. Any flaw indications detected during the required examinations will be dispositioned in accordance with the acceptance criteria and corrective actions program elements that follow.

Element 6 - Acceptance Criteria

Seabrook Station PWR Vessel Internals Program inspections, indications and relevant conditions detected during examination will be evaluated in accordance with ASME Section XI, Article IWB-3500. MRP-227 provides additional information for the examination acceptance criteria for the primary and expansion components. The criteria for expanding the examinations beyond the Primary Components will include the Expansion Components. The examination acceptance criteria will include: (i) specific, descriptive relevant conditions for the VT-3 visual examinations; (ii) requirements for recording and dispositioning surface breaking indications that are detected and sized for length by the VT-1/EVT-1 visual examinations; and (iii) requirements for system-level assessment of bolted or pinned assemblies with volumetric (UT) examination indications that exceed specified limits.

Detected conditions that do not satisfy these examination acceptance criteria will be dispositioned using the Seabrook Station Corrective Action Program. The acceptance criteria, for any indications, will document that the component intended functions will be maintained during the period of extended operation.

Element 7 - Corrective Actions

All indications will be evaluated per the acceptance criteria. Unacceptable indications will be corrected through implementation of appropriate repair or replacement activities.

Indications noted will be entered into the Seabrook Station Corrective Action Program for appropriate disposition. A repair, replacement, or evaluation will be performed for all flaws that exceed the acceptance standards. Additional guidance for disposition of unacceptable conditions for reactor vessel internals will be found in the ASME Code, Section XI; in MRP-227 Guidelines; and in reports referenced therein or demonstrated through an appropriate technical justification. MRP-227 provides information on methodology that will be used for the evaluation of detected conditions that exceed the examination acceptance criteria. The flaw evaluation methodology accounts for the accumulated neutron exposure and the resulting loss of fracture toughness due to radiation embrittlement in assessing the suitability of the component for continued service. Justification for flaw evaluation fracture toughness limits is provided in Section 6 of MRP-227.

Repair or replacement activities comply with ASME Section XI as invoked by 10 CFR 50.55a or approved ASME Code Cases as referenced in the latest version of NRC Regulatory Guide 1.147, "*Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1.*" Proposed alternative repair/replacement activities, if any, will be submitted to the NRC for review and approval in accordance with 10 CFR 50.55a(a)(3)(i) or 10 CFR 50.55a(a)(3)(ii).

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 7 Corrective Actions.

Element 8 - Confirmation Process

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 8 Confirmation Process.

Element 9 - Administrative Controls

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 9 Administrative Controls.

Element 10 - Operating Experience

As discussed in MRP-227, the PWR Vessel Internals aging degradation has been observed in foreign PWRs, with emphasis on cracking of baffle-former bolting. Because of the foreign operating experience, the U.S. PWR owners and operators began a program a decade ago to inspect the baffle-former bolting in order to determine whether similar problems might be expected in U.S. plants. To support future inspections and evaluations the industry also began substantial laboratory testing projects in order to gather the materials data necessary.

The Seabrook Station PWR Vessel Internals Program is a new program to be implemented prior to the period of extended operation. A review of plant specific operating experience related to the Seabrook Station Reactor Vessel Internals identified no aging management issues. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, Table IWB-2500-1, Examination Category B-N-3 inspections of the Seabrook Station Reactor Vessel Internals, have not identified any unacceptable indications.

The EPRI Pressurized Water Reactor Internals Inspection and Evaluation Guidelines, which forms the basis of the Seabrook Station PWR Vessel Internals Program, is based upon industry operating experience, research data, and vendor evaluations. Development of the program relies on the consensus review and inputs of the MRP Reactor Internals Core and Focus Groups, which include representatives from utilities, research scientists, and vendors. This program will continue to evolve as additional experience is gained. Reactor Vessel internals failures, both domestic and foreign, have been considered in the development of MRP-227.

FPL participates in the industry programs for investigating and managing aging effects on PWR Vessel Internals. Through its participation in EPRI MRP activities, FPL and Seabrook Station will continue to benefit from the reporting of PWR Vessel Internals inspection information, and will share its own internals inspection results with the industry, as appropriate. The Seabrook Station PWR Vessel Internals Program will implement applicable results of the industry programs.

Exceptions to NUREG-1800

None

Enhancements

None

Conclusion

The Seabrook Station PWR Vessel Internals Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.8 FLOW-ACCELERATED CORROSION

Program Description

The Seabrook Station Flow-Accelerated Corrosion (FAC) Program is an existing program that manages the aging effects of loss of material due to wall thinning on the internal surfaces of carbon or low alloy steel piping, elbows, reducers, tees, expanders, and valve bodies which contain high energy fluids (both single phase and two phase flow). The program is based on the EPRI guideline NSAC-202L-R2, "*Recommendations for an Effective Flow Accelerated Corrosion Program"* and uses Chexal Horowitz Engineering/ Corrosion Workstation (CHECWORKS) as a predictive tool. Included in the program are: (a) an analysis to determine FAC susceptible lines, (b) performance of baseline inspections, (c) follow-up inspections to confirm the predictions, and (d) repairing or replacing components, as necessary.

The Seabrook Station FAC Program includes component susceptibility determination, inspection requirements, acceptance criteria, repair and replacement criteria, expansion criteria, and reporting requirements.

The Seabrook Station FAC Program is an analysis, inspection and verification program; thus, there is no preventive action.

The Seabrook Station Water Chemistry program, B.2.1.2, is utilized to control pH and dissolved oxygen. When the FAC Program identifies components to be repaired or replaced, the use of FAC resistant materials and or configuration changes are considered.

This aging management program monitors the aging effects of flow-accelerated corrosion on the intended function of piping and components by measuring wall thickness using non-destructive examination and performing analytical evaluations.

Components are inspected for wall thinning due to flow-accelerated corrosion using ultrasonic or radiography examinations. Ultrasonic examination provides more complete data for measuring the remaining wall thickness. As described in the EPRI Recommendations for an Effective Flow Accelerated Corrosion Program, radiography is commonly used on small-bore piping because it can be performed without removing pipe insulation and during plant operation with components in service. Evaluation of the results is performed by FAC engineers and is not used to identify other mechanisms (i.e., cracking or weld indications). Valves, orifices, equipment nozzles, and other like components that cannot be inspected completely with ultrasonic examinations due to their shape and thickness are evaluated based on the wear of piping located immediately downstream. Analytical models developed with computer programs, including CHECWORKS, are used to predict locations that are susceptible to flow-accelerated corrosion in piping systems based on specific plant data including material, configuration, hydrodynamic conditions, and operating conditions.

The FAC inspection schedule is developed based on the CHECWORKS predictive code, re-examinations from previous outages, and plant specific and industry operating experience. The predicted extent of wall thinning for susceptible components is updated after each refueling outage. The component examination data is compiled and maintained with identification of the specific outage or time of inspection. The next scheduled inspection is based on the remaining service life recalculated after each inspection. The FAC Program inspection results are used to calculate the number of operating cycles remaining before the component reaches minimum allowable wall thickness. If calculations indicate that an area will reach the minimum wall thickness before the next inspection interval, the component must be repaired, replaced, or re-evaluated.

The CHECWORKS model was revised in January 2005 to reflect plant conditions following the Seabrook Station power uprate. Operating conditions affecting flow accelerated corrosion were updated in CHECWORKS and the predictive model rerun to identify additional areas of susceptibility and any re-ranking of highly-susceptible locations. The current scope and frequency of FAC related inspections are based on those conditions.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M17.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Wall thinning problems in single-phase systems have occurred throughout the industry in Feedwater and Condensate systems, and in two-phase piping in Extraction Steam lines and Moisture Separator Reheater and Feedwater heater drain lines. The FAC Program was originally outlined in NUREG-1344, *"Erosion/Corrosion-Induced Pipe Wall Thinning in U.S. Nuclear Power Plants"* (April 1989) and implemented through GL 89-08, *"Erosion/Corrosion-Induced Pipe Wall Thinning"* (May 1989). The Seabrook Station program has evolved through industry experience and is now implemented using the guidelines of EPRI NSAC-202L-R2 and CHECWORKS as a predictive tool. Selection of monitoring locations and inspection methods have improved over time based on industry and plant operating experience.

Seabrook Station has not experienced any failures of piping covered by the FAC program with the exception of a minor leak in a non-safety related small-bore socket welded fitting not modeled in CHECWORKS. Wall loss by flow-accelerated corrosion within a socket welded fitting cannot be found using ultrasonic inspection techniques. Seabrook Station has implemented a radiography inspection program to screen susceptible small-bore piping for potential FAC related degradation. This inspection is focused on areas where personnel hazards may be created in the event of a through wall leak.

Further review of operating experience at Seabrook Station, as discussed below, demonstrates that the FAC Program is effective at detection, correction, and resolution of conditions leading to and resulting from flow accelerated corrosion.

1. Following the initial CHECWORKS implementation in 1991, the Seabrook Station high pressure Extraction Steam piping was determined to be highly susceptible to FAC and several areas were inspected as part of the first FAC inspections. As a result, a significant portion of this piping was found to be degraded and was replaced with a more FAC-resistant material (Chrome-Moly). No failure of this piping occurred prior to replacement and no degradation has been noted in the replacement piping.

2. In September 2006, a self-assessment of the FAC Program was performed. No program weaknesses were identified during the self-assessment. The following were identified as strengths: a) Detailed FAC Susceptibility Analysis, b) Incorporation of power uprate condition into the CHECKWORKS model, c) Conversion of CHECKWORKS to the latest EPRI Steam/Feedwater Application version, and d) Use of operating experience for evaluating applicability to Seabrook Station. Areas for continued program improvement were identified for future inclusion to strengthen the overall program.

   Additionally, the FPL/NextEra Energy Corporate input to the 2006 Seabrook Station FAC Self-Assessment cited the following as examples of appropriate assessment and response to industry operating experience:

   a. In August 2004, a 22 inch pipe downstream of a condensate system flow orifice ruptured killing five workers in the Mihama [Japan] nuclear power plant. The cause of the accident was attributed to pipe wall thinning due to flow accelerated corrosion immediately downstream of a flow orifice. Piping and component configuration play an integral part in the FAC process. The Mihama event was assessed for applicability to Seabrook Station by the FAC Engineer. It was determined that condensate and Feedwater system flow measuring devices at Seabrook Station use venturis and not orifice plates as was the case at Mihama. Piping downstream of five of the six venturis had previously been inspected with no unacceptable wear noted. The sixth downstream location was included in the scope for the subsequent outage and found to have no unacceptable degradation.

b. Subsequent to the discovery of degradation/failure of Feedwater heaters in the industry, Seabrook Station developed a program to assess the condition of Feedwater heaters. Based on the guidance of the CHECKWORKS Users Group recommendations, Seabrook Station developed and implemented an inspection plan to systematically evaluate the conditions of these heaters.

   As of Refueling Outage 13 (Fall of 2009), Seabrook Station has completed inspection of all Feedwater heaters for degradation. In Refueling Outage 08 (Spring of 2002), only one heater, CO-E-25A, was found to have wall thinning. The thinning was in an area below the Extraction Steam inlet nozzle. The area was repaired using weld overlay and is being monitored each refueling outage. No additional wall thinning has been noted since this repair.

3. During Refueling Outage 13 (Fall of 2009), a section of 18 inch Feedwater pipe immediately downstream of a main Feedwater control valve was replaced after being monitored for several cycles and showing signs of continued wear. An engineering change document was developed for the replacement of this pipe section. The use of a FAC-resistant material (chrome-moly) was considered, however, the pipe section was replaced with the original material (carbon steel) due to concerns identified by EPRI that the creation of a chrome-moly to carbon steel interface could create a downstream location that is more susceptible to FAC. The replaced piping will remain in the FAC program and be monitored for wall thinning.

The operating experience of the Seabrook Station Flow-Accelerated Corrosion Program provides objective evidence that the program effectively monitors and trends the aging effects of FAC on piping and components and takes appropriate corrective action prior to the loss of an intended function. Assessments of the Flow-Accelerated Corrosion Program are performed to identify the areas that need improvement to maintain the effective performance of the program.

Conclusion

The Seabrook Station Flow-Accelerated Corrosion Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.9 BOLTING INTEGRITY

Program Description

The Seabrook Station Bolting Integrity Program is an existing program that manages the aging effects of cracking due to stress corrosion cracking, loss of material due to general, crevice, pitting, and galvanic corrosion, microbiologically influenced corrosion, fouling and wear, and loss of preload due to thermal effects, gasket creep, and self loosening associated with bolting. The program manages these aging effects through the performance of periodic inspections. The program also includes repair/replacement controls for ASME Section XI related bolting and generic guidance regarding material selection, thread lubrication and assembly of bolted joints. The program follows the guidelines and recommendations delineated in NUREG-1339, *"Resolution of Generic Safety Issue 29; Bolting Degradation or Failure of Bolting in Nuclear Power Plants"*, EPRI NP-5769, *"Degradation and Failure of Bolting in Nuclear Power Plants"* (with the exceptions noted in NUREG-1339), and EPRI TR-104213, *"Bolted Joint Maintenance and Application Guide"* for comprehensive bolting maintenance. The Seabrook Station Bolting Integrity Program credits other aging management programs for the inspection of bolting. These programs and their scopes are:

a. The Seabrook Station ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program (B.2.1.1) provides the requirements for Inservice Inspection of ASME Class 1, 2, and 3 piping, which includes pressure retaining bolting.

b. The Seabrook Station ASME Section XI, Subsection IWE Program (B.2.1.27) includes steel containment shells and their integral attachments.

c. The Seabrook Station ASME Section XI, Subsection IWF Program (B.2.1.29) provides the requirements for Inservice Inspection of ASME Class 1, 2, and 3 component supports.

d. The Seabrook Station Buried Piping and Tanks Program (B.2.1.22) provide the requirements for the periodic visual inspections of corrosion on buried piping and tanks, including bolting.

e. The Seabrook Station External Surfaces Monitoring Program (B.2.1.24) provides the requirements for the inspection of bolting for steel components such as piping.

f. The Seabrook Station Structures Monitoring Program (B.2.1.31) provides the requirements for the inspection of structural support bolting.

The program includes periodic inspection of closure bolting assemblies to detect signs of leakage that may be indicative of loss of preload, loss of material, or crack initiation. Periodic inspection of bolted closures in conjunction with the Seabrook Station Inservice Inspection Program and Seabrook Station External Surfaces Monitoring Program will detect the aging effects and joint leakage. Operator rounds and system walkdowns will also identify joint leakage.

This program covers bolting within the scope of license renewal, including: 1) safety-related bolting, 2) bolting for nuclear steam supply system component supports, 3) bolting for other pressure retaining components, including non-safety related bolting, and 4) structural bolting. The aging management of reactor head closure studs is addressed by Seabrook Station Reactor Head Closure Studs Program (B.2.1.3) and is not included in this program.

The Seabrook Station Bolting Integrity Program manages the aging effects associated with bolting through material selection and testing, bolting assembly and pre-load control, operation, maintenance, and the performance of periodic inspections. The program also includes repair and replacement controls and requirements on the selection of thread lubricants, consideration of lubricant use on torque determination, and assembly requirements (bolting/torque patterns).

The selection of bolting materials and the use of lubricants at Seabrook Station are based on design specifications, vendor and industry recommendations, and station specifications for torque and bolting material substitution, and follow the guidance of EPRI NP-5769 and NUREG-1339 to prevent or mitigate degradation and failure of safety-related bolting. Bolting replacement activities include the application of appropriate gasket alignment, torque, and preload, based on EPRI documents.

ASME Class 1, 2, and 3 pressure boundary closures are inspected for leakage, loss of material, cracking, and loss of preload by Seabrook Station ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program (B.2.1.1). ASME Class 1, 2, and 3 component support bolting is managed by Seabrook Station ASME Section XI, Subsection IWF Program (B.2.1.29). High strength bolts (≥ 150KSI) are used in ASME Section XI component support applications. These bolts use slotted holes and double nuts in lieu of prestressing, thereby avoiding concerns for stress corrosion cracking associated with high pre-stress loads. Additionally, these bolts are not subjected to molybdenum disulfide lubricants – a potential driver of stress corrosion cracking.

ASME Class 1, 2, and 3 pressure boundary closure inspection requirements are in accordance with the requirements of ASME Section XI, Tables IWB

2500-1, IWC 2500-1, and IWD-2500-1, editions endorsed in 10 CFR 50.55a(b)(2) and the recommendations of EPRI-5769.

The ASME Section XI programs use three types of examination: surface, volumetric, and visual. Surface examinations indicate the presence of surface discontinuities and may be conducted by magnetic particle, liquid penetrate, or an eddy current test method. Volumetric examination indicates the presence of discontinuities throughout the volume of material and may be conducted from either the inside or outside of a component. Structural bolting and fasteners are inspected by visual examinations. Components found defective are further inspected to assess the extent of degradation.

Visual examinations cover a number of observation techniques. VT-1 visual examinations detect discontinuities and imperfections on the surface of components, including such conditions as cracks, wear, or corrosion. VT-2 visual examinations detect evidence of leakage from pressure retaining components. VT-3 visual examinations determine the general mechanical and structural condition of components and their supports by verifying parameters such as clearances, settings, and physical displacements and by detecting discontinuities and imperfections, such as loss of integrity at bolted connections, loose or missing parts, debris, corrosion, wear, or erosion. These inspection techniques will identify incipient degradation such as crack initiation or loss of material due to corrosion which could result in closure bolting leakage.

Examination schedules meet the requirements of ASME Section XI, Subsections IWB, IWC, and IWD for Class 1, 2, and 3 pressure retaining bolting. Examination schedules also meet the requirements of ASME Section XI, Subsection IWF for Class 1, 2, and 3 component supports bolting.

For bolting covered by other inspection programs, identified leakage is evaluated through the site Corrective Action Program and appropriate actions such as immediate repair, increased monitoring, etc. are implemented based on the significance and impact of the leak. This may include daily checks, such as those performed during operations walk downs, or other actions depending on the significance, trend, and As Low As Reasonably Achievable (ALARA) considerations.

Indications of aging identified in ASME pressure retaining bolting during Inservice Inspection are evaluated per ASME Section XI, Subsections 3600. Indications of aging identified in other pressure retaining bolting, nuclear steam supply system component supports, or structural bolting are evaluated through the Corrective Action Program.

Upon detection of degraded conditions, follow-up inspections, repairs, replacements, or application of additional testing methods are performed as required by the site Corrective Action Program and applicable acceptance criteria of ASME Section XI. Follow-up actions could include torque checks, bolt removal, ASME Section XI type examinations, or use of other diagnostic techniques. For ASME pressure retaining bolting, repairs and replacements are performed in accordance with the Seabrook Station ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program (B.2.1.1).

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M18.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Both the industry and NRC have revealed a number of concerns involving bolting ranging from material control and certification to bolting practices and the impact of aging mechanisms. The Seabrook Station Bolting Integrity Program is effective at identifying, correcting, or improving issues associated with these concerns. Examples of supporting Operating Experience include the following.

1. In August 2000, during a System Engineer's periodic system walkdown, several deficiencies were noted in the Residual Heat Removal Equipment Vault, including corroded pipe support bolting. Engineering evaluated the area and found most of the support bolting in acceptable condition. The actual rusted bolts were not in severe condition and a work order was issued to correct the condition. The support was painted in June 2001 to preventing further degradation.

2. In June 2001, the inspection of bolting on a Train "A" Primary Component Cooling Water valve revealed surface corrosion. Subsequently, the subject bolting was inspected by engineering and it was determined that the structural integrity of the flanged bolting was not an immediate concern. However, it was determined that the bolting needed to be replaced as soon as possible. A design change was issued to allow the use of coated bolts as replacements for the originals. Accordingly, the bolting on Train "A" valve was replaced in September 2001. As part of the extent of condition review, the bolting on Train "B" Primary Component Cooling Water valve was also replaced with coated bolts.

3. In July 2001, during a system engineer's periodic system containment walk-down, the Primary Component Cooling Water system inlet and outlet valves associated with the Containment Air Handling coolers were identified as having corrosion on the valve bonnets and body to bonnet bolting due to condensation. Corrective action included painting the valve bonnets and associated bolting as previous painting of the affected valve bodies had been shown to be effective at preventing further degradation of the carbon steel components caused by condensation.
4. During Refueling Outage 8 (Spring of 2002), bolting replacement on the Primary Component Cooling Water system piping flanges associated with one of the Containment Air Handling Coolers showed signs of galvanic corrosion. The corrosion was attributed to condensation and the combination of carbon steel bolting and copper alloy flanges. Corrective actions included issuing a design change to authorize the substitution of studs and nuts made of stainless steel material in place of the carbon steel studs and nuts originally specified. Subsequently, between July 2003 and April 2004, all of the studs and nuts associated with all six Containment Air Handling Coolers were replaced.
5. In February 2005, during the performance of an ASME Section XI 18 month leakage reduction walkdown, a small boric acid leak was noted on Containment Building Spray heat exchanger channel head bolted connection. An engineering review concluded that there was no degradation of materials that would affect system operability at that time. The subject gasket was scheduled for replacement at the next outage and the subject joint was identified for increased monitoring during system walkdowns. Subsequently, the gasket was replaced during Refueling Outage 11 (Fall of 2006). The same bolted connection was reported to be leaking on February 8, 2007. On March 16, 2007, the torque value was increased to stop the leakage.

These examples demonstrate that the deficiencies associated with bolted joints are effectively identified and corrected.

Conclusion

The Seabrook Station Bolting Integrity Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operations.

B.2.1.10 STEAM GENERATOR TUBE INTEGRITY

Program Description

The Seabrook Station Steam Generator Tube Integrity Program is an existing program that manages the aging effects of cracking due to intergranular attack, outer diameter stress corrosion cracking, primary water stress corrosion cracking, and stress corrosion cracking; loss of material due to general, crevice and pitting corrosion, erosion, fretting and wear; reduction of heat transfer due to fouling, and wall thinning from flow accelerated corrosion of the Steam Generator components. The Seabrook Station program is applicable to managing the aging of Steam Generator tubes, tube plugs, and tube supports. Seabrook Station has not used tube sleeving repair.

Industry experience has shown that mill annealed alloy 600 Steam Generator tubes have experienced tube degradation due to corrosion, primary water stress corrosion cracking, outside diameter stress corrosion cracking, intergranular attack, pitting, and wastage, along with other mechanically induced degradation, such as denting, wear, impingement damage, and fatigue. The Seabrook Station Steam Generator tubes are Alloy 600 thermally treated tubes. The dominant degradation mode at this time for thermally treated alloy 600 tubes is wear.

The Seabrook Station Steam Generator Tube Integrity Program is based on NEI 97-06 Rev. 2, *"Steam Generator Program Guidelines",* the response and commitment to Generic Letter 97-06, *"Degradation of Steam Generator Internals"*, and Seabrook Station Technical Specification 3/4.4.5, "*Steam Generators*," which ensure that the performance criteria for structural integrity, accident-induced leakage, and operational leakage are not exceeded. Seabrook Station has implemented the operational leakage limits found in NUREG-1431, *"Standard Technical Specifications for Westinghouse Pressurized Water Reactors"*.

This program identifies and maintains Steam Generator design and licensing basis, and establishes a framework for prevention, inspection, evaluation, repair and leakage monitoring measures to ensure that program requirements are met. Operational leakage limits are included to ensure that, should substantial tube leakage develop, prompt action is taken. These limits are described in Seabrook Station Technical Specifications.

Seabrook Station Technical Specification 6.7.6.k, *"Steam Generator (SG) Program",* specifies Steam Generator inspection scope, frequency, and acceptance criteria for the plugging and repair of flawed tubes. NRC Regulatory Guide (RG) 1.121, *"Bases for Plugging Degraded Steam Generator Tubes",* provides guidelines for determining the tube repair criteria and operational leakage limits.

The program includes preventive measures to mitigate degradation related to corrosion phenomena through water chemistry control and the secondary side cleaning and inspection. The Water Chemistry Program, B.2.1.2, mitigates the potentially corrosive effects of the primary and secondary water on the interior and exterior surfaces of the Steam Generator tubes and other Steam Generator internals.

The Steam Generator Tube Integrity Program includes foreign material exclusion guidance, consistent with NEI 97-06. The program includes prevention and detection of foreign objects in the secondary side of the Steam Generators as a means to inhibit wear degradation by performing foreign object search and retrieval at each inspection outage when the hand-hole covers are removed for Steam Generator cleaning.

The objectives of the secondary side inspection plan are to inspect the Steam Generators for foreign objects, perform visual assessments of sludge and visual inspections for secondary side integrity and corrosion. The secondary side inspections have been expanded to examine additional areas of the upper tube bundle and inner tube bundle. The upper internal regions of the tube bundle are inspected for sludge accumulation on the tube support plates. Secondary side inspections are performed every third refueling outage.

The program provides criteria for the qualification of personnel, specific inspection techniques, and associated acquisition and analysis of data, including procedures, probe selection, analysis protocols, and reporting criteria. The performance criteria pertain to structural integrity, accident-induced leakage, and operational leakage.

Nondestructive examination techniques are used to inspect all tubing materials to identify tubes with degradation that may need to be removed from service or repaired. Tubes containing flaws that do not meet the acceptance criteria are plugged. Assessment of tube integrity and plugging or repair criteria of flawed tubes is in accordance with Seabrook Station Technical Specifications.

Degraded plugs and tube supports are evaluated in accordance with the Seabrook Station Corrective Action Program. The program includes requirements for assessment of degradation mechanisms that consider operating experience from similar steam generators and, for each mechanism, defines the inspection techniques as well as the sampling strategy. Compliance with NRC Regulatory Guide 1.121 for plugging or repairing steam generator tubes is achieved through implementation of the NEI 97-06 criteria as incorporated into the program and Seabrook Station Technical Specifications.

Tube inspection scope and frequency, plugging or repair, and leakage monitoring are in accordance with the Seabrook Station Technical Specifications and the Seabrook Station Steam Generator Tube Integrity Program implemented in accordance with NEI 97-06.

Plug inspection scope and frequency, plugging or repair, and leakage monitoring are in accordance with the Seabrook Station Steam Generator Tube Integrity Program implemented in accordance with NEI 97-06.

Tube support plate inspection scope and frequency are in accordance with the Seabrook Station Steam Generator Tube Integrity Program implemented in accordance with NEI 97-06 as well as the program enhancements committed to in Seabrook Station's response to GL 97-06.

Tube integrity is demonstrated by satisfying the structural integrity and leakage performance criteria in conjunction with the performance acceptance standards. Condition monitoring and assessments are performed after inspections to verify that structural and leakage integrity will be maintained for the operating interval between inspections. Comparison of the results of the condition monitoring assessment with the predictions of the previous operational assessment provides feedback for evaluation of the adequacy of the operational assessment and additional insights that can be incorporated into the next operational assessment.

NUREG-1801 Consistency

This program, with the exception noted below, is consistent with NUREG-1801-XI.M19.

Exceptions to NUREG-1801

1. NUREG-1801 XI.M19 states "*… the licensee's commitment to implement the SG degradation management program described in NEI 97-06, are adequate to manage the effects of aging on the SG tubes, plugs, sleeves, and tube supports.*" The References section for NUREG-1801 XI.M19 identifies NEI 97-06, *"Steam Generator Program Guidelines"* as Revision 1, dated January 2001.

   The Seabrook Station Steam Generator Tube Integrity Program is based on NEI 97-06, *"Steam Generator Program Guidelines"*, Revision 2, dated May 2005.

   <u>Justification for Exception</u>

   Revision 2 of NEI 97-06 did not reduce the functional requirements of Revision 1. In NEI correspondence with the NRC (Alex Marion to Dr. Brian

W Sheron) dated September 9, 2005, *"Steam Generator Program Guidelines, Revision 2"*, NEI states that Revision 2 of NEI 97-06 is consistent with Technical Specification Task Force Traveler TSTF-449 Revision 4, *"Steam Generator Tube Integrity."* The NRC staff review and approval of TSTF-449, Revision 4, was documented in Generic Letter 2006-01, *"Steam Generator Tube Integrity and Associated Technical Specifications"*. Seabrook Station implemented TSTF-449 with License Amendment 115 to Technical Specifications in June of 2007. The approval of TSTF-449 Revision 4 justifies the use of Revision 2 of NEI 97-06.

Program Elements Affected: Element 1 (Scope of Program).

Enhancements

None

Operating Experience

1. Seabrook Station is a four-loop plant with Westinghouse Model F Steam Generators. There are 5626 tubes in each of the four Steam Generators. The design of these Steam Generators includes Alloy 600 thermally treated tubing, full-depth hydraulically expanded tubesheet joints, with urethane (hydrostatic) tack expansions at the tube ends. The tube support plates are broach-holed quatrefoil plates fabricated of Type 405 stainless steel. The U-bends of the first ten rows of tubing were stress relieved after bending. Seabrook Station has completed 13 cycles of plant operations. To date, Seabrook Station has identified the following tube degradation mechanisms:
    a. anti-vibration bar wear due to flow induced vibration in the U-bends of larger radius tubes
    b. minor wear at flow distribution baffles associated with pressure pulse cleaning
    c. possible wear due to foreign objects
    d. outside diameter stress corrosion cracking in a small subset of tubes with elevated residual stress in Steam Generator "D"
    e. top of tubesheet outside diameter stress corrosion cracking in one tube in Steam Generator "C"

2. During Refueling Outage 8 (Spring of 2002), axial indications were identified on several Steam Generator tubes at the quatrefoil tube support plates in Steam Generator "D" with eddy current testing and confirmed with ultrasonic examination. A root cause evaluation was performed and concluded that outside diameter stress corrosion cracking was the degradation mechanism for the Seabrook Station's Steam Generators. The

root cause of the cracking has been determined to be high residual stress due to a manufacturing anomaly in a defined subset of Seabrook Station Steam Generator tubes. A total of 21 tubes were identified in the subset, 15 of which had cracks and were plugged. The remaining 6 tubes were inspected and plugged in Refueling Outage 9 (Fall of 2003). Subsequent inspections have shown that outside diameter stress corrosion cracking was limited to the defined subset of the tube population and no longer exists in the Seabrook Station Steam Generators for tubes with high residual stress.

3. During Refueling Outage 12 (Spring of 2008), foreign objects were discovered in Steam Generator “B” during the inspection of the steam drum area. The root cause evaluation was performed, which concluded that the cause of the foreign objects being in the Steam Generator was inadequate foreign material exclusion controls of material used in Steam Generator “B” steam drum inspection. The root cause evaluation’s recommended corrective action to prevent re-occurrence was to revise the job plan for Steam Generator inspection to include a pre-use inspection of all materials brought into the Steam Generators for concealed/loose foreign material. This corrective action has been implemented.

4. The Steam Generator degradation assessment for Refueling Outage 13 (Fall of 2009) identified operating experience at Vogtle Unit 1 where axial and circumferential outside diameter stress corrosion cracking was reported at the top of the hot leg tubesheet. Vogtle has Westinghouse Model F Steam Generators with Alloy 600 thermally treated tubing similar to Seabrook Station. Vogtle Unit 1 was the first U.S. plant to report axial outside diameter stress corrosion cracking at the top of the tube sheet in a Model F Steam Generator. Accordingly, this operating experience was incorporated into the implementation plan for Refueling Outage 13 (Fall of 2009) as part of the Steam Generator inspections.

   Subsequently, during Seabrook station’s Refueling Outage 13, top of tube sheet inspections were completed. An axial outside diameter stress corrosion cracking indication was found on one tube in Steam Generator “C” hot leg. The indication was approximately 0.2 inches below the top of the tube sheet and was 0.10 inches long. The tube was plugged on both the hot leg and cold leg sides.

   The Steam Generator degradation assessment for Refueling Outage 13 also discusses the status of anti-vibration bar wear and the minor wear at flow distribution baffles associated with pressure pulse cleaning.

   The flow distribution baffle wear was discovered in Steam Generators “A” and “D”. A single wear indication was reported during Refueling Outage 9

(Fall of 2003) at the flow distribution baffle. These indications were retested at Refueling Outage 11 (Fall 2006) to determine if there was any progression of the wear. These indications are attributed to a prior pressure pulse cleaning of the steam generators, based on the location of the indications relative to the pressure pulse locations. Similar indications have been observed in other Model F steam generators at other plants that have applied the pressure pulse cleaning process. The re-examination of these indications at Refueling Outage 11 (Fall of 2006) resulted in no degradation found at the location in Steam Generator “A” and no progression of the wear of the indication in Steam Generator “D”.

The anti-vibration bar wear is flow induced vibration at the intersections of the tubes with the anti-vibration bars and is an existing indication in all four Steam Generators. Analysis has determined that for Model F Steam Generators, the number of tubes considered susceptible to anti-vibration bar wear is typically less than 3% of the total number of tubes, with only a fraction of the susceptible tubes expected to require plugging. Tubes that were plugged for anti-vibration bar wear continue to wear after plugging and have been observed to wear through wall after a period of time. Analysis for Seabrook Station concluded that the originally worn plugged tubes would not achieve a condition that could present risk of tube separation before contacting the adjacent tubes. It was further determined that, if an active tube is adjacent to a worn, plugged tube, the progression of contact wear on the active tube would be very slow and sufficient operating time is available under the current Seabrook Station inspection plan (4 Steam Generators per outage, every other outage) that wear would be identified during the planned inspections. Continuing wear on a plugged tube is benign with respect to tube separation since no risk of tube separation was identified for any axially oriented degradation mechanisms.

5. Through Refueling Outage 13 (Fall of 2009), Seabrook Station has plugged a total of 173 tubes in the Steam Generators (A-34, B-25, C-50, and D-64).

The operating experience of the Seabrook Station Steam Generator Tube Integrity Program provides objective evidence that the program effectively identifies degradation prior to loss of intended function. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. External operating experience is effectively reviewed and incorporated into the Seabrook Station Steam Generator Tube Integrity Program.

Conclusion

The Seabrook Station Steam Generator Tube Integrity Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.11 OPEN-CYCLE COOLING WATER SYSTEM

Program Description

The Seabrook Station Open-Cycle Cooling Water System Program is an existing program that manages the aging effects of:

a. hardening and loss of strength due to elastomer degradation,

b. loss of material due to erosion, due to general, pitting, crevice and galvanic corrosion, due to microbiologically influenced corrosion and fouling and due to liner/coating degradation, and

c. reduction of heat transfer by fouling of specific components.

The program manages aging effects in both safety related and non-safety related components in portions of the Circulating Water, Primary Component Cooling Water, Service Water and Diesel Generator systems. At Seabrook Station, the ultimate heat sink complex consists of the Atlantic Ocean and the draft evaporative cooling tower.

This program relies on the implementation of the recommendations of NRC Generic Letter (GL) 89-13, "*Service Water System Problems Affecting Safety-Related Equipment*" to ensure that the aging effects on the open-cycle cooling water systems will be adequately managed for the period of extended operation. The program, as mandated by GL 89-13, includes (a) surveillance and control of corrosion, erosion, protective coating failure, bio-fouling, silting, and heat transfer degradation, (b) tests to verify heat transfer, (c) routine inspection and maintenance of plant components, (d) system walk downs to ensure compliance with the stations licensing basis and (e) a review of maintenance, operating and training practices and procedures to ensure the effectiveness of established programs.

The Seabrook Station Chlorine Management Program controls micro-biological and macro-biological fouling. Periodic visual inspection of piping and periodic inspection and cleaning of Service Water supply structures ensure adequate monitoring and removal of biofouling agents, corrosion products and silt. Heat transfer capabilities are ensured by periodic performance verification of the heat exchangers within the scope of this program.

Subsequent to the receipt of NRC GL 89-13, Seabrook Station completed the recommended system walk down and review of maintenance, operating and training practices and procedures to ensure the effectiveness of established programs. The Seabrook Station Open-Cycle Cooling Water System Program complies with NRC GL 89-13 recommendations.

The Open-Cycle Cooling Water System piping and components within the scope of this program are constructed of various materials with specific consideration given to their suitability for service in this environment. Materials of construction include carbon steel (lined and unlined), stainless steels, copper and nickel alloys, titanium and elastomers. Where appropriate, piping and components are lined with cement, polyurethane, rubber, or other material to provide protection to the underlying metal surfaces from aggressive cooling water environments. New and replacement materials (such as AL6XN stainless steel) which are highly resistant to corrosion in a salt water environment are included in engineering design change considerations.

The Seabrook Station Open-Cycle Cooling Water System Program includes a variety of inspection and testing methods such as visual, eddy current and ultrasonic test (UT) inspections on plant heat exchangers and piping These activities are designed to detect degradation due to corrosion, microbiologically influenced corrosion, biofouling, silt, debris, and scaling prior to loss of intended function. Visual inspections of elastomers (e.g., rubber expansion joints) are performed to detect erosion and elastomer degradation. Rubber expansion joints are also examined when removed for maintenance activities to provide a more detailed evaluation of condition.

Loss of material due to microbiologically influenced corrosion, fouling, erosion, and corrosion (general, pitting, crevice and galvanic) is managed by Seabrook Station's Chlorine Management Program through aggressive control of the attachment and growth of marine organisms within these systems. Where the piping is lined, the condition of the liner provides sufficient evidence to verify that water has not penetrated the liner material where it could contribute to loss of material by corrosion. If there is indication of possible liner degradation, the portion of the liner is removed and the affected area inspected by UT measurement for wall loss. Following any necessary repairs, the liner is repaired with a suitable material.

Commitments to NRC GL 89-13 established routine inspections and methods of testing for Service Water system piping and components such that corrosion, erosion, silting, and biofouling do not degrade the performance of the Open-Cycle Cooling Water System components.

System Engineers routinely perform system walk downs in accordance with Plant Engineering Guidelines to assess system health and material condition. Service Water flow is routinely monitored by System Engineers as part of normal system performance monitoring to ensure design flow requirements are available for the intended functions.

Performance of Primary Component Cooling Water system and Diesel Generator system safety related heat exchangers is monitored in accordance with Seabrook Station's Service Water Heat Exchanger Program to ensure that heat transfer capabilities comply with the design bases requirements of the systems. These are the only heat exchangers within the scope of License Renewal that are supplied by Service Water. The key elements of this monitoring program are:

a. Temperature Ratio Monitoring of Primary Component Cooling Water heat exchangers is performed at least monthly, and increased to weekly if the condenser pressure deviates by a specified amount from the clean condenser baseline curve. Due to similarities in materials (titanium tubes) and flow media (low temperature sea water), sensitive and readily indicated parameters in the condensers are used as leading indicators of conditions in the Primary Component Cooling Water heat exchangers.

b. Fouling Factor Determination of Diesel Generator Jacket Water Cooling heat exchangers is performed at least once per year. These heat exchangers are normally idle, but are placed in service at least weekly to eliminate stagnant flow conditions.

c. Micro-biological fouling monitoring is performed at least weekly on the Primary Component Cooling Water system and Diesel Generator system heat exchangers while the plant is between 90% and 100% power.

d. The System Engineer documents and trends results and, as necessary, coordinates disposition of unusual or unexpected result with Operations, Chemistry or Engineering personnel. Any unusual or unexpected results are documented and tracked by the Seabrook Station Corrective Action Program.

Selected portions of the Open-Cycle Cooling Water System are subjected to periodic functional and pressure tests as required for safety-related components by ASME Section XI Inservice Inspection.

The Seabrook Station Open-Cycle Cooling Water System Program ensures removal of biofouling agents, corrosion products and silt by periodic visual inspection of piping and by periodic inspection and cleaning of Service Water supply structures. Each Service Water train contains an in-line strainer that is located downstream of both the ocean and the cooling tower pumps and upstream of all other major components in this system. Accumulation of biofouling agents, corrosion products and silt in the in-line Service Water strainers would be indicated by increasing differential pressure across an affected strainer. This differential pressure is monitored each shift by Operations personnel and high differential pressure alarms in the control room.

Open-Cycle Cooling Water System water supply structures, including the sea water inlet and outlet transition structures, the Service Water and Circulating Water pumphouse forebays and the Service Water Cooling Tower basin, are periodically inspected and cleaned to minimize accumulation of biofouling agents, corrosion products, biological material, and silt. The pumphouse forebays are inspected and cleaned each refueling outage and the cooling tower basin is inspected and cleaned, if required, every third refueling outage. Aging effects for these structures will be adequately managed by the Structural Monitoring Program (B.2.1.31).

Inspection and cleaning of the on-shore and off-shore Circulating Water Intake and Discharge Structures is performed periodically to minimize attraction of marine animals and to ensure that there is no impediment to cooling water flow. The on-shore intake and discharge structures are inspected and cleaned at least once every fourth fuel cycle. The off-shore intake and discharge structures are inspected and cleaned at least once every other fuel cycle.

The Seabrook Station Chlorine Management Program provides proceduralized preventive measures to monitor and inject chemicals (chlorine) to mitigate microbiologically influenced corrosion and buildup of macroscopic biological fouling species, such as blue mussels, oysters or clams, and to inhibit scale formation on heat transfer surfaces in the Open-Cycle Cooling Water systems.

Seabrook Station does not have a history of significant biofouling or microbiologically influenced corrosion in the Open-Cycle Cooling Water systems. This is attributable to an aggressive chlorination program, and substantiated by the recent lack of indication of any notable form of bio-fouling documented during the internal surfaces inspections.

In addition to inspection for evidence of fouling, internal piping inspections are used to monitor for potential loss of material. Each refueling outage, a portion of the Service Water system is chosen for inspection of internal surfaces. The primary objective of these inspections is detection of liner degradation, conditions that could lead to liner degradation, and signs of behind-liner corrosion. A video record of each inspection is provided to the System Engineer for review. Indications of liner degradation are evaluated during the outage in which they are identified and any necessary repairs or extent of condition evaluations performed prior to plant startup.

Indication of pipe liner degradation is evaluated for potential loss of material due to general, pitting, crevice and galvanic corrosion in the piping material beneath. Where necessary, the suspect pipe liner is removed and the pipe wall internal surface inspected for corrosion and loss of material. The External Surfaces Monitoring Program (B.2.1.24), is credited for monitoring and trending of above ground Open-Cycle Cooling Water System piping and components for loss of material where that loss of material mechanism may originate from the internal surface (pitting, general corrosion, etc) but be undetected by indications in the liner material. These indications would become evident as through-wall leaks. The Buried Piping and Tank Inspection Program (B.2.1.22), is credited for monitoring and trending of buried Open-Cycle Cooling Water System piping and components for loss of material that may originate from the internal surface but be undetected by indications in the liner material. These programs are also credited for monitoring and trending Open-Cycle Cooling Water System piping and components for external surface aging effects.

The acceptance criteria are specified in the procedures that control the inspections of components. Pipe wall thickness is measured and compared to the minimum wall thickness for fabrication specified in the applicable pipe specification. Any area found to be below this minimum wall thickness is evaluated by engineering for adherence to design minimum wall thickness for the specific application.

Biofouling is chemically controlled or removed as part of the activities performed under this program. Seabrook Station Open-Cycle Cooling Water System heat exchangers are monitored, cleaned, inspected and tested as necessary to ensure the components are maintained and not degraded such that the component and system heat transfer function is maintained and reliable. Acceptance criteria are based on maintaining the system free of significant sediment and biofouling, and surveillances to ensure the Open-Cycle Cooling Water System is able to perform its intended functions.

Unusual or unexpected conditions noted during Open-Cycle Cooling Water System inspections are documented in accordance with the Seabrook Station Corrective Action Program. Such conditions are evaluated by engineering personnel to ensure the continued reliability of the Open-Cycle Cooling Water System.

NUREG-1801 Consistency

This program, with the exception noted below, is consistent with NUREG-1801 XI.M20.

Exceptions to NUREG-1801

1. NUREG-1801 XI.M20 states *"The system components are constructed of appropriate materials and lined or coated to protect the underlying metal surfaces from being exposed to aggressive cooling water environments".* The Seabrook Station Open Cycle Cooling Water System includes both unlined and lined piping as part of its design. Since NUREG 1801 program only addresses lined piping and the fact that the Seabrook Station system design includes unlined piping is considered an exception to the NUREG-1801 program.

   <u>Justification for the Exception</u>

   The selection of materials for use in this cooling water environment (salt water) included the installation of unlined piping and components of materials such as Inconel, copper-nickel, aluminum-bronze and stainless steels (including newer stainless steels such as AL6XN) specifically for their resistance to the effects of salt water. These materials are subjected to the same aging mechanisms as if they were lined or coated, and are subject to the same aging management activities described the NUREG-1801 XI.M020 Open-Cycle Cooling Water System aging management program. Therefore, this program will manage unlined piping as well as it will manage lined piping.

   Program Elements Affected: Element 2 (Preventive Actions).

Enhancements

None

Operating Experience

1. During initial installation of Service Water cement lined piping, X-Pando joint compound was used to seal the gaps in the cement lining at the field welded joints. Improper application or long term degradation of this joint compound resulted in localized corrosion of the carbon steel pipe due to sea water intrusion through the gap at the joints. The following improvements have been made to the Service Water piping in order to prevent degradation of the Service Water piping at the field-welded joints.

   a. The cement lined underground piping has been refurbished by installing AMEX-10/WEKO seals at the field welded joints. The AMEX-10/WEKO seal is an elastomer boot seal installed from inside the pipe to prevent sea water from reaching the welded joint. Follow up inspections have been performed to confirm that the seals have been effective in preventing corrosion of the field welded joints. Selected seals will continue to be inspected during refueling outages to ensure that seals are not degraded and continue to be effective in sealing the field welded joints from sea water intrusion.

b. The cement lined above ground piping associated with the Diesel Generator heat exchangers has been replaced with flanged Plastisol PVC lined carbon steel spool pieces. The size and accessibility of this piping did not permit the use of AMEX-10/WEKO seals. Follow up inspections of weld areas by ultrasonic testing and internal visual examinations during refueling outages have confirmed that the engineering design change has been effective in preventing loss of material.

c. Above ground piping located in the turbine building has been refurbished by installing AMEX-10/WEKO seals at field welded joints similar to the methodology utilized for refurbishing the underground piping discussed above.

d. Ultrasonic examinations have been performed on above ground field welded joints where AMEX-10/WEKO seals had not been installed (or could not be installed due to piping configuration) to assess the condition of the piping at the field-welded joints. Joints which revealed wall thinning have been repaired.

2. The original Primary Component Cooling Water system heat exchangers were fabricated with 90-10 CuNi tubing. Both heat exchangers were retubed with 90-10 CuNi tubes due to evidence of tube leakage. As a result of the issues with CuNi tubing, both Primary Component Cooling Water system heat exchangers were subsequently replaced with titanium tubed heat exchangers during Refueling Outage 5 (Spring of 1997). The follow up eddy current inspections in Refueling Outages 10 (Spring of 2005) and 13 (Fall of 2009) have shown that the performance of the titanium tubes has been excellent.

3. The Service Water pump house forebays are inspected and cleaned during each refueling outage. During the cleaning of the Service Water pump house forebay during Refueling Outage 7 (Spring of 2001), an increase in the amount of silt and debris was observed in the area of the Service Water pumps. The normal levels of silt in previous outages were up to 3 feet starting at the traveling screens tapering down to zero around the pump suction bell. Refueling Outage 7 inspections revealed levels of up to 6 feet at the traveling screens tapering down to zero at the pump suction bell. It is approximately 32 feet from the screens to the pump suction. The material was sand, silt, and mussel shells. Evaluation of the condition indicated that the additional debris accumulation was caused by a combination of events as described below.

Seabrook Station experienced an unusually high mussel shell impingement during the summer of 2000. This was attributed to an extended cessation of intake tunnel chlorination from late October 1999 to early May 2000. For a six month period, mussel larvae entrained by the tunnel had an enhanced opportunity to settle and grow on the intake tunnel wall surface, in a chlorine-free environment. Although the Service Water pumphouse forebays were continuously chlorinated during that period, on resumption of intake tunnel chlorination, a large number of mussels were released in the intake tunnel and carried to the forebay. This increase in shells in the forebay led to shell pieces being carried over the traveling screens when screen washing was initiated.

Service Water system strainer valve isolation issues during this same period precluded the ability to isolate the Service Water strainers for cleaning. To minimize the likelihood of carryover of mussel shells to the strainers and possibly creating a high differential pressure condition, screen wash activities were minimized until Refueling Outage 7 at which time the strainer isolation valves could be repaired or replaced. This allowed sand and silt to build up at a higher rate than normal due to the fact we were no longer upsetting the areas around the traveling screens.

Sand and silt is small enough to pass through the system with no interruption of flow. Large amounts of sand and silt may affect the bearing surfaces on the Service Water pump shafts, but the pumps will continue to provide sufficient Service Water flow. Increased wear on the bearings from excessive silt would be first noticed with an increase in vibration levels. Pump vibration levels, flows, and differential pressures are tested quarterly. This condition (silt accumulation in the forebay) did not present a plant operability issue.

As a result of this condition, the Seabrook Station Chemistry Department has re-evaluated the period during which the ocean water intake tunnels should be continuously chlorinated. This expanded chlorination period, in addition to batch chlorination of the Service Water forebay as necessary during the rest of the year has resulted in no further carryover of debris at the traveling screens. Inspections of the Service Water forebay during subsequent inspections have showed no excessive accumulations. The Service Water strainer isolation valves have been restored to service and are available if needed. Traveling screen washing activities were returned to original schedules.

Although the events contributing to this condition are not necessarily aging related, this example does demonstrate that monitoring and control of silt and fouling mechanisms is effective in preventing conditions that could adversely affect the intended function of Service Water components. Such conditions are evaluated and corrected in accordance with GL 89-13 requirements for surveillance and control of biofouling to ensure that silting and biofouling cannot degrade the performance of safety related systems serviced by Open Cycle Cooling Water.

4. As discussed above in example 1, during initial installation of Service Water cement lined piping, X-Pando joint compound was used to seal the gaps in the cement lining at the field welded joints. Improper application or long term degradation of this joint compound results in localized corrosion. An upgrade project was initiated due to the localized corrosion of the carbon steel pipe due to sea water intrusion through the gap at field welded joints. Since the completion of the Service Water Upgrade Project and installation of drop-out spools and AMEX-10/WEKO seals in the mid 1990's, ten through wall leaks have developed. In January 2006, the Service Water System Engineer initiated a Service Water Improvement Plan to evaluate and resolve issues pertaining to these leaks in the Service Water system.

   The Service Water Improvement Plan evaluated current practices for AMEX-10/WEKO seal installation, inspection and testing, field weld ultrasonic examinations, and the history of pipe leaks following the upgrade project. Of particular note was that following the upgrade project, there had been no leaks at Service Water welded joints except for a single occurrence of weepage from a 2 inch Weldolet to pipe weld. The results indicated that the Upgrade Project had adequately resolved the issue of through wall leaks at field welded joints.

   Based on the history of leaks and the areas where those leaks were being found, the System Engineer concluded that the surface ultrasonic examinations performed at welded joints was ineffective because the examination area was not where the leaks were developing and the technique did not work well to detect minor, pin-hole leaks as they were developing. Visual examination of the pipe liner had proved to be a more efficient way to identify areas of pipe wall degradation. Review of video tapes of prior AMEX-10/WEKO seal inspections showed indications on the concrete liner where through wall leaks later developed. Recommendations from this Plan included preparation of a long term plan for visual inspections of above ground pipe through either direct or remote visual methods, enhancement of the current plan for visual inspections of buried pipe to include a specific long range scope and schedule, removal and analysis of a section of installed cement lined Service Water pipe to evaluate the condition of the liner material after more than 25 years of service, and enhancement of the AMEX-10/WEKO seal testing and inspection activity to specifically include monitoring for surface conditions that may indicate beneath-liner corrosion.

Implementation of the Service Water Improvement Plan recommendations was completed by January 2007, with the exception of the laboratory analysis of the cement lined pipe section. The laboratory analysis of the cement lined pipe section was completed in 2008 and concluded that the cement liner material was still in excellent condition and would continue to provide adequate protection of the pipe.

While individual problems, such as, those discussed above, have been identified, the conditions identified did not cause impact on the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of the Open-Cycle Cooling Water System Program are performed to identify the areas that need improvement to maintain the effective performance of the program. The previous examples of operating experience provide objective evidence that the Seabrook Station Open-Cycle Cooling Water System Program will be effective in ensuring that intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

Conclusion

The Seabrook Station Open-Cycle Cooling Water Systems Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.12 CLOSED – CYCLE COOLING WATER SYSTEM

Program Description

The Seabrook Station Closed-Cycle Cooling Water System Program is an existing program that manages the aging effects of (a) cracking due to stress corrosion cracking, (b) loss of material due to general, crevice, pitting and galvanic corrosion, and (c) reduction of heat transfer due to fouling. These aging effects are managed in closed cycle cooling water systems that are not subject to significant sources of contamination, in which water chemistry is controlled and in which heat is not directly rejected to the ultimate heat sink. The program scope includes activities to manage aging in the Primary Component Cooling Water system and Emergency Diesel Generator Jacket Water cooling systems. The program also includes the fire pump diesel engine glycol coolant system, the Control Building Air Handling glycol coolant system (safety-related), and the Thermal Barrier Cooling Water system.

The chemical treatment used for the Primary Component Cooling Water and the Thermal Barrier Cooling Water is hydrazine. The chemical treatment used for the Diesel Generator Jacket Water, the fire pump diesel coolant, and the Control Building Air Handling coolant is glycol.

The Seabrook Station design control program ensures that appropriate materials are used within the system to minimize corrosion and stress corrosion cracking. The systems included in the Seabrook Station Closed-Cycle Cooling Water System Program contain no lined pipe and rely upon appropriate system material selection to minimize corrosion.

The program includes maintenance of system corrosion inhibitor concentrations to minimize degradation, and inspections of opportunity to assess management of component aging.

Seabrook Station implements the industry standards established by EPRI Technical Report 1007820, *"Closed Cooling Water Chemistry Guideline, Revision 1"*, which was issued in April 2004. The program includes monitoring and control of cooling water chemistry to minimize exposure to aggressive environments and use of corrosion inhibitors in the closed cycle cooling water systems to mitigate general, crevice, and pitting corrosion as well as stress corrosion cracking. The program provides the action levels associated with criteria being outside normal operating levels. EPRI 1007820, issued in April 2004, is Revision 1 to EPRI TR-107396 which was issued in October 1997. Since NUREG-1801 refers to EPRI TR-107396 *"Closed Cooling Water Chemistry Guideline"*, Seabrook Station has identified this as an exception.

The Seabrook Station Closed-Cycle Cooling Water System Program identifies the water chemistry parameters to be monitored to ensure that corrosion inhibitor concentrations are maintained within the specified EPRI 1007820 guidelines for the closed-cycle cooling water systems. The program includes guidance to control and monitor the inhibitor concentrations, and the action levels associated with criteria being outside normal operating levels. The program also identifies the normal range, as well as administrative limits (where applicable), sampling frequency, and corrective actions. Sampling frequencies are based on the EPRI 1007820 guidelines.

The system corrosion inhibitor concentrations are maintained within the limits specified in the EPRI 1007820 "*Closed Cooling Water Chemistry Guideline, Revision 1"* except as noted below.

a. Seabrook Station's normal operating range for hydrazine in the Thermal Barrier Cooling Water (a separate closed-cycle cooling loop within the Primary Component Cooling Water system) is specified as 5-300 parts per million (ppm). The EPRI Guidelines consider a normal operating range of 5-50 ppm (5-200 ppm for all-ferrous metallurgy). The higher limit to the operating range was established as a method to minimize radiation exposure required for hydrazine makeup during power operations. Action

Levels 1 and 2 (<5 ppm and <1 ppm, respectively) remain consistent with those specified by the EPRI 1007820 guideline.

b. The Seabrook Station normal range for sulfates in Thermal Barrier Cooling Water is specified as 100-500 parts per billion (ppb) with Action Level 1 and 2 limits of >500 ppb and >1000 ppb, respectively. The EPRI Guidelines consider a normal operating range of ≤150 ppb with Action Level 1 and 2 limits of >150 ppb and >1000 ppb, respectively. The higher operating range and the higher Action Level 1 limit were assigned prior to issuance of EPRI 1007820 *"Closed Cooling Water Chemistry Guideline, Revision 1."* The previous revision did not specify an operating range. The current values were evaluated in a plant Chemistry Study / Technical Information Document. The Action Level 2 limit is consistent with that specified in EPRI 1007820 guideline.

c. The frequency of sampling Thermal Barrier Cooling Water hydrazine and pH remains at a monthly interval based on Seabrook Station operating experience instead of weekly as shown in the EPRI 1007820 guideline for Tier 1 Systems. Data trends support the fact that hydrazine concentration and system pH remain stable between the monthly entries into Containment to obtain samples.

The fire pump diesel engine glycol coolant system, the Control Building Air Handling glycol coolant system, and the Diesel Generator Jacket Water glycol coolant system are periodically monitored. Frequencies of testing and control parameters are consistent with the EPRI guidelines for blended glycol formulations.

Corrosion test coupons are placed in the Primary Component Cooling Water and Thermal Barrier Cooling Water systems to check the effectiveness of the inhibitor and/or the corrosion rates. The criteria for and frequency of coupon inspection is specified in the Seabrook Station Chemistry Procedure *"Corrosion Determination by Coupons"*.

The Seabrook Station Closed-Cycle Cooling Water System Program recognizes that component inspections are an important part of an overall chemistry program to assess corrosion control and chemistry control effectiveness. Seabrook Station Chemistry Procedure, *"Visual Inspection Format for Plant Components"* provides instructions for visual inspection of individual components (e.g., valves, pumps, piping segments, heat exchangers) looking for pitting, general corrosion film presence, biological activity, deposits, etc. when a system or component is open for maintenance. Historical records of these inspections, including photographs, are maintained for comparative purposes.

System walkdowns, System Engineer monitoring and trending, and preparation of periodic system health reports help to ensure the systems' performance meets established design basis requirements.

NUREG-1801 Consistency

This program, with the exceptions noted below, is consistent with NUREG-1801 XI.M21.

Exceptions to NUREG-1801

1. NUREG-1801 XI.M21 states "*The program relies on the maintenance of system corrosion inhibitor concentrations within the specified limits of Electric Power Research Institute (EPRI) TR-107396 to minimize corrosion and SCC.*"

   EPRI TR-107396, *"Closed Cooling Water Chemistry Guideline",* was issued in October 1997. Seabrook Station implements the guidance provided in EPRI 1007820, *"Closed Cooling Water Chemistry Guideline, Revision 1",* issued in 2004.

   <u>Justification for the Exception</u>

   Seabrook Station has reviewed EPRI 1007820 and determined that the most significant difference is that the revision provides more prescriptive guidance. EPRI 1007820 meets the same requirements of EPRI TR-107396 for maintaining conditions to minimize corrosion and microbiological growth in closed cooling water systems for effectively mitigating aging effects. The NUREG-1801 aging management program requirements are unchanged by the transition from EPRI TR-107396 to EPRI 1007820 guideline.

   Program Elements Affected: Element 2 (Preventive Actions), Element 5 (Monitoring and Trending), and Element 6 (Acceptance Criteria).

2. EPRI 1007820, *"Closed Cooling Water Chemistry Guideline, Revision 1",* in Section 5.6 *"Hydrazine-Based Programs"* Table 5-5, *"Operating Ranges and Monitoring Frequencies for Hydrogen-Based Programs"*, provides the following normal operating range for hydrazine:

Parameter	Normal Operating Range
Hydrazine, mixed metallurgy	5–50 ppm as N_2H_4
Hydrazine, all-ferrous	5–200 ppm as

metallurgy	N_2H_4

Seabrook Station's Thermal Barrier Cooling Water system is a separate closed-cycle cooling water system that is age managed under the Seabrook Station Closed-Cycle Cooling Water System Program. Seabrook Station has specified the normal operating range for hydrazine in this system at between 5-300 ppm.

Justification for the Exception

The Thermal Barrier Cooling System is located entirely inside the containment. The higher limit to the hydrazine operating range was established to minimize radiation exposure required for hydrazine makeup during power operations. Action Levels 1 and 2 (<5 ppm and <1 ppm, respectively) remain consistent with those specified by the latest revision of the EPRI guidelines. Seabrook Station Chemistry evaluated the significance of operation of the system within this range for hydrazine and determined it to be acceptable based on a review of the potential effects on components and materials and a plan to slowly increase the concentration while monitoring system parameters. In September of 2002, it was decided to raise the upper band for hydrazine in the system from 150 ppm to 300 ppm. The increase was performed in 50 ppm increments every six months until 300 ppm was reached or until there was evidence of increased copper corrosion. The upper limit of 300 ppm was reached without indication of increased copper corrosion.

Corrosion strip test coupons are placed in the Thermal Barrier Cooling System to check the effectiveness of the inhibitor and its effect on corrosion rates.

Program Elements Affected: Element 2 (Preventive Actions), Element 5 (Monitoring and Trending), and Element 6 (Acceptance Criteria)

3. EPRI 1007820, *"Closed Cooling Water Chemistry Guideline, Revision 1",* in Section 5.6 *"Hydrazine-Based Programs"* Table 5-5, "*Operating Ranges and Monitoring Frequencies for Hydrogen-Based Programs*" provides the following normal operating range for sulfates.

Parameter	Normal Operating Range	Action Levels (AL 1 – 90 days AL 2 – 30 days)
Chloride, Fluoride, Sulfate	≤150 ppb as ion (each)	AL 1: >150 ppb AL 2: >1000 ppb

The Seabrook Station Thermal Barrier Cooling Water System is a separate closed-cycle cooling water system that is age managed under the Closed Cycle Cooling Water Program. Seabrook Station has specified a normal operating range for Sulfates in this system between 100-500 ppb with Action Level 1 and 2 limits of >500 ppb and >1000 ppb, respectively.

Justification for the Exception

The higher allowable sulfate operating range (100 to 500 ppb) and the higher Action Level 1 limit (> 500 ppb) for the Thermal Barrier Cooling Water were assigned prior to issue of EPRI 1007820. The previous revision did not specify an operating range. The Action Level 2 limit is consistent with that specified in the latest revision of the EPRI guidelines. Seabrook Station Chemistry evaluated the significance of continued operation of the system within this range for sulfates. The evaluation was to assess the current corrosion environment and estimate the future effect in the Thermal Barrier System based on the current system chemistry parameters, particularly, sulfate. The conclusion of this evaluation was that the low oxygen levels, alkaline pH and absence of sulfides exhibited in the Seabrook Station Thermal Barrier Cooling Water would mitigate the concern regarding the levels of sulfate above 150 ppb.

Program Elements Affected: Element 2 (Preventive Actions) and Element 5 (Monitoring and Trending).

4. EPRI 1007820, *"Closed Cooling Water Chemistry Guideline, Revision 1", S*ection 5.6 *"Hydrazine-Based Programs"* Table 5-5, *"Operating Ranges and Monitoring Frequencies for Hydrogen-Based Programs"* provides the following monitoring frequency for hydrazine and pH for Tier 1 systems.

Parameter	Monitoring Frequency
	Tier 1 Systems
Hydrazine, mixed metallurgy	Weekly
Hydrazine, all-ferrous metallurgy	Weekly
pH, mixed metallurgy	Weekly
pH, all-ferrous metallurgy	Weekly

Seabrook Station has kept the Thermal Barrier Cooling Water system monitoring frequency for hydrazine and pH at monthly instead of weekly as shown in the latest revision of the EPRI guidelines for Tier 1 Systems.

Justification for the Exception

The Thermal Barrier Cooling Water system is located entirely inside the Containment. Keeping the monitoring frequency at monthly was desired to minimize radiation exposure. System data trends show that hydrazine concentration and system pH remain stable between the monthly entries into Containment to obtain samples, which demonstrates that a monthly monitoring frequency is sufficient.

Program Elements Affected: Element 3 (Parameters Monitored/Inspected) and Element 5 (Monitoring and Trending).

5. NUREG-1801 XI.M21 states; "*The aging management program monitors the effects of corrosion and stress corrosion cracking by testing and inspection in accordance with guidance in EPRI TR-107396 to evaluate system and component condition. For pumps, the parameters monitored include flow, discharge pressures, and suction pressures. For heat exchangers the parameters include flow, inlet and outlet temperatures, and differential pressure."*

   The Seabrook Station Closed-Cycle Cooling Water System Program does not rely on performance and functional testing to verify the effectiveness of chemistry controls and management of aging effects.

   Justification for the Exception

   EPRI 1007820 notes that performance testing is typically part of an engineering program that verifies the component active functions. These activities would fall under the Maintenance Rule (10 CFR 50.65). This being the case, performance and functional testing is not included as a part of the Seabrook Station Closed-Cycle Cooling Water System Program. Seabrook Station uses corrosion monitoring and internal inspections of opportunity to monitor program effectiveness at managing component degradation that could impact a passive function. Corrosion monitoring is accomplished through trending of the normal plant periodic sampling, and monitoring of corrosion coupons. The periodic sampling tests for corrosion products which when trended will give an indication of the rate of corrosion ongoing in a system. Seabrook Station also places test coupons in the Primary Component Cooling Water system and Thermal Barrier Cooling Water System to check the effectiveness of the corrosion inhibitor by quantifying the corrosion rates of the coupons. Seabrook Station Chemistry procedure, *"Visual Inspection Format for Plant Components"* provides instructions for visual inspection of individual components (e.g., valves, pumps, piping segments, heat exchangers) looking for pitting, general corrosion film presence, biological activity, deposits, etc. This procedure is used to monitor for corrosion in the component cooling water systems when the system or components are opened for maintenance.

Program Elements Affected: Element 3 (Parameters Monitored/Inspected), Element 4 (Detection of Aging Effects), Element 5 (Monitoring and Trending), and Element 6 (Acceptance Criteria)

Enhancements

The following enhancement will be made prior to entering the period of extended operation.

1. The Seabrook Station Closed-Cycle Cooling Water System Program will be enhanced to include visual inspection for cracking, loss of material and fouling in the Primary Component Cooling Water system, Thermal Barrier Cooling Water system, Diesel Generator Jacket Water cooling system, Fire Pump Diesel Engine coolant system, and the Control Building Air Handling coolant system when these systems are opened for maintenance.

   Program Elements Affected: Element 4 (Detection of Aging Effects).

Operating Experience

Seabrook Station has a comprehensive operating experience program that monitors industry issues/events and assesses these for applicability to its own operations. In addition, the Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues/events. Those issues and events, whether external or plant specific, that are potentially significant to the closed-cycle cooling water systems at Seabrook Station are evaluated. The Seabrook Station Closed-Cycle Cooling Water System Program is augmented, as appropriate, if these evaluations show that program changes will enhance program effectiveness.

1. During Operating Cycle 9 (May 2002 - October 2003), Chemistry Department personnel reported that the hydrazine consumption in the Thermal Barrier Cooling Water system had gone up significantly since Refueling Outage 7 (Fall of 2000). Chemistry personnel reported that only two chemical additions were required during each of Cycles 5, 6 and 7. However, the chemical additions had increased to four during Cycle 8 and to six by middle of Cycle 9. Investigation of the condition identified potential air entrapment in the Thermal Barrier Cooling Water system. As a result, during Refueling Outage 9 (Fall of 2003), the Thermal Barrier Cooling Water system was statically and dynamically vented, which resolved the issue.

2. A 2003 Industry Operating Experience notice was reviewed by Seabrook Station Chemistry Department for applicability. The issue was cracking of brass bolting in the Diesel Generator Jacket Water cooling system. Evaluation showed that Seabrook Station utilizes a glycol mixture which is similar in constituents, but much higher in concentration than that used at the facility issuing the operating experience. For example, tolytriazole in the reporting facility's system is maintained between 5-20 ppm while the minimum specification for tolytriazole at Seabrook Station is 300 ppm. Seabrook Station's limits are based on recommendations from the vendor, a contract laboratory, and EPRI guidelines for closed-cycle cooling water systems. The tolytriazole is specifically added to minimize copper (brass) corrosion. The EPRI guidelines on Closed Cooling Water Chemistry states that tolytriazole reacts with the copper ion to form a thin film that reinforces the oxide film on the copper layer. This film helps to protect the copper from degrading. The tolytriazole levels are checked on a semi-annual basis which has been proven to be sufficient through trending. The evaluation concluded that Seabrook Station's tolytriazole dosage levels are sufficient to minimize brass degradation. The evaluation shows Seabrook Station's use of industry experience to challenge existing program practices, and validate existing program procedures through experiences or standards applied at other nuclear power plants.

3. In November 2009, a Nuclear Oversight audit of the Seabrook Station's Chemistry Control Program was conducted. This audit included a review the chemistry control of the Closed Cooling Water systems at Seabrook Station. The audit results were as follows:

   The audit found that the *"Seabrook Strategic Water Chemistry Optimization Plan – Closed Cooling Water Systems"* is used to establish site-specific Water Chemistry Program that represents the best approach for minimizing corrosion damage and performance losses in the various closed cooling water systems. Seabrook Station *"Miscellaneous Systems / Closed Cooling Water Systems Chemistry Control Program"* provided the details for sampling and analysis of Closed Cooling Water systems.

   The audit concluded that the Seabrook Station Closed Cycle Cooling Water System Program contained all the required attributes found in the EPRI Closed Cooling Water Chemistry Guidelines, Revision 01, Section One *"Instructions"*, and Section 10 *"Methodology for Plant Specific Treatment Optimization."*

   The audit reviewed Chemistry Department logs and Nuclear Oversight Daily Quality Summary Reports associated with closed cycle cooling water system chemistry for compliance with the schedule and analyses specified in the Seabrook Station *"Miscellaneous Systems / Closed Cooling Water*

Systems Chemistry Control Program" and EPRI *"Closed Cooling Water Chemistry Guideline, Revision 1."*

During the audit, all sample data for the Closed Cooling Water systems listed below were reviewed for sampling frequency and analytical results:

a. Primary Component Cooling Water
b. Thermal Barrier Cooling Water
c. Secondary Component Cooling Water
d. Diesel Generator Cooling Water
e. Diesel Fire Pump Cooling Water
f. Safety Related Control Building Air Handling Train "A"
g. Safety Related Control Building Air Handling Train "B"
h. Control Building Air Handling (Non-Safety)

The audit found no instances where required samples were not obtained or programmatic requirements were not met for Closed Cooling Water. A review of sample results indicated that samples are obtained and evaluated as detailed in the Seabrook Station *"Miscellaneous Systems / Closed Cooling Water Systems Chemistry Control Program"* and the Chemistry Department uses the Corrective Action Program to document the occurrence of out-of-specification Closed Cooling Water system results.

The audit concluded that the Closed Cooling Water Systems Chemistry Control Program met the requirements of Station Chemistry Manual and the EPRI Closed Cooling Water Chemistry Control Guidelines and that the Chemistry control of the Closed Cooling Water systems was satisfactory.

These operating experience examples provide objective evidence that the Seabrook Station Closed-Cycle Cooling Water Program is effective in monitoring closed-cycle cooling water chemistry parameters, identifying anomalies, initiating corrective actions, and effectively evaluating external operating experience. Assessments of the Closed-Cycle Cooling Water System Program are performed to identify the areas that need improvement to maintain the effective performance of the program.

Conclusion

The Seabrook Station Closed-Cycle Cooling Water System Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.13 INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD (RELATED TO REFUELING) HANDLING SYSTEMS

Program Description

The Seabrook Station Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program is an existing program that manages the aging effects of loss of material due to general corrosion and due to wear of structural components of lifting systems and the effects of loss of material due to wear on the rails in the rail system, for lifting systems within the scope of license renewal. Included in scope are those cranes encompassed by the Seabrook Station commitments to NUREG-0612, "*Control of Heavy Loads at Nuclear Power Plants*," plus two cranes related to fuel handling.

The program manages loss of material due to general corrosion on structural steel members and rails of the cranes within the scope of license renewal. Included are the structural steel members of the bridges, trolleys and monorails. The program also manages loss of material due to wear on rails. Only the structural portions of the in-scope cranes and monorails are in the scope of this program. The individual components of these overhead handling systems that are subject to periodic replacement, or those which perform their intended function through moving parts or a change in configuration, are not in the scope of this program.

The program employs the use of visual inspections to identify aging effects prior to loss of function. Preventive actions are not associated with these activities.

The design of the cranes within the scope of this program did not impose a limit to the number of overcapacity lifts that they would withstand. Additionally, these systems have their loads limited to those within their rated capacity. Because of these procedural controls and the design basis, deterioration of the structural members due to operational fatigue is not expected, and usage of these systems is not recorded.

Structural inspections are conducted under the Seabrook Station lifting systems manual. Periodic inspections are conducted at the frequencies, and include the applicable items, delineated in ANSI B30.2, "*Overhead and Gantry Cranes,*" ANSI B30.11, "*Monorails and Underhung Cranes,*" ANSI B30.16, " *Overhead Hoists (Underhung),*" and ANSI B30.17, "*Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)*" for a periodic inspection and in accordance with appropriate manufacturer's recommendations. Inspections are conducted yearly. All periodic inspections are documented on work orders.

Because the program is an inspection program, there are no monitoring and trending activities required.

Degradation of the crane structure due to loss of material through corrosion or wear is evaluated according to vendor recommendations and applicable industry standards as specified in the respective crane inspection procedures. If the crane was designed to a specific Crane Manufacturers Association of America Service Class, the specification that was applicable at the time the crane was manufactured is used.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M23.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be made prior to entering the period of extended operation.

1. The Seabrook Station Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program Lifting System Manual will be enhanced to include monitoring of general corrosion on the crane and trolley structural components and the effects of wear on the rails in the rail system.

   Program Elements Affected: Element 1 (Scope of Program) and Element 3 (Parameters Monitored/Inspected)

2. The Seabrook Station Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program Lifting Systems Manual will be enhanced to list additional cranes related to the refueling handling system.

   Program Elements Affected: Element 1 (Scope of Program) and Element 4 (Detection of Aging Effects)

Operating Experience

There has been no history of corrosion-related degradation that has impaired cranes. Likewise, because cranes have not been operated beyond their design lifetime, there have been no significant fatigue-related structural failures noted by industry experience. Seabrook Station has a comprehensive Operating Experience Program that monitors and assesses industry issues/events for applicability. In addition, the Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues/events. Preventive Maintenance Work Orders are used for tracking, identifying, and maintaining crane structural components of lifting systems and crane rail systems.

1. A review of a sample of Preventive Maintenance Work Orders, for the cranes within the scope of license renewal reveals no history of wear or structural degradation. Examples include periodic inspections of the Spent Fuel Pool Crane and the Cask Handling Crane, and refueling outage inspection of the Containment Polar Gantry Crane.

2. A review of the Seabrook Station Corrective Action Program by tag number shows that there has been no history of rail or structural wear or corrosion related degradation due to aging related mechanisms that has impaired prevented these cranes from performing their intended function.

3. A condition report generated in 1997 identified a potential for an over load lift by overhead cranes in the Diesel Generator rooms. Evaluation of the condition report determined that no over load lifts had occurred, and provided modifications to the two cranes to preclude any future overload.

The above operating experience review provides evidence that the Seabrook Station Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program is effective in maintaining equipment condition, identifying potential deficiencies, and taking effective corrective actions to resolve issues that may challenge the long-term operability and reliability of the associated systems, structures and components.

Conclusion

The Seabrook Station Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.14 COMPRESSED AIR MONITORING

Program Description

The Seabrook Station Compressed Air Monitoring Program is an existing program that manages the aging effects of (a) hardening and loss of strength due to elastomer degradation, (b) loss of material due to crevice, general, galvanic, and pitting corrosion, and (c) reduction of heat transfer due to fouling of the plant compressed air systems components. The Seabrook Compressed Air Program manages aging in three systems: the plant compressed air system, the containment compressed air system, and the Diesel Generator compressed air subsystem. The program ensures an oil free dry air environment in the compressed air systems. The systems are comprised of components made of stainless steel, carbon steel and copper alloys.

The Seabrook Station Compressed Air Monitoring Program was developed using:

a. Generic Letter (GL) 88-14, *"Instrument Air Supply Problems Affecting Safety related Equipment"*,
b. INPO SOER 88-01, "*Instrument Air System Failures",*
c. ANSI.ISA-7.0.01, *"Quality Standard for Instrument Air - formerly ANSI/ISA S7.0.01-1996",*
d. ISA-S7.3, *"Quality Standard for Instrument Air",*
e. NRC information Notice (IN) 81-38*, "Potentially Significant Equipment Failures Resulting From Contamination of Air-Operated Systems"*,
f. IN 87-28, *"Air System Problems at U.S. Light Water Reactors*",
g. EPRI guidance document NP-7097, *"Instrument Air Systems, A Guide for Power Plant Maintenance Personnel",* issued in 1990,
h. Technical Report TR-108147, *"Compressor and Instrument Air System Maintenance Guide",* and
i. The Standard and Guide for Operation and Maintenance of Nuclear Power Plants, ASME OM-S/G-1998, Part 17, *"Performance Testing of Instrument Air Systems in Light Water Reactor Power Plants"*.

In its response to Generic Letter 88-14, Seabrook Station committed to maintain instrument air quality in accordance with the Quality Standard for Instrument Air, ISA-S7.3, *"Quality Standard for Instrument Air".* Compliance with ISA-S7.3 is verified by continuous monitoring and periodic testing. In-line dew point monitors are used to verify that the dew point of instrument air at the outlet of the instrument air system dryers is at or below a calculated limit. In-line filters are installed which limit air system maximum entrained particle size. These in-line filters meet or exceed the requirements of the quality standard. Periodic replacement of filters is part of the preventative maintenance program for instrument air systems. Air samples are obtained at least annually and tested to ensure compliance with air quality standards. Additionally, a preventative maintenance program encompassing air system component inspection and repair has been in place since the system was initially placed in service.

The Seabrook Station Compressed Air Monitoring Program includes preventive maintenance activities to check compressed air quality at several locations in the system. The testing includes samples from the compressed air systems on an annual frequency. The program includes leak testing (monitoring) of system components.

Air samples are taken at several locations in the plant compressed air and containment compressed air systems at least annually and tested to ensure compliance with air quality standards. The testing includes samples from the compressed air systems. Dew point is not tested during this annual sampling for the plant compressed air system and the containment compressed air system. Dew point is measured continuously at the discharge of the air dryers in these systems so the sample frequency for dew point is continuous instead of being annual. This is not considered an exception from NUREG 1801.

In-line dew point monitors in the plant compressed air system and the containment compressed air system are used to continuously verify that the dew point of instrument air at the outlet of the air dryers is at or below a calculated limit. The dew point at the outlet of the plant compressed air system dryers is maintained at or below -40 °F. Containment compressed air dew point is maintained at least less than 18°F below containment ambient temperature. The Diesel Generator compressed air sub system dew point is maintained at least 18°F below the lowest expected ambient temperature and is not higher than 39°F.

In-line filters are installed which limit air system maximum entrained particle size. Particles are removed by duplex filters in each instrument air header and filter/regulators supplied with each end user. These in-line filters meet or exceed the 40 micron particle size in the industry standard (ISA-S7.3). All duplex filters are inspected and cleaned or replaced every 5 years.

The instrument air headers are blown down at various low points on an approximately 18 month frequency. As part of this process, the air quality is observed by looking for moisture and loose particulate. The blow down observations are documented to allow for trending of instrument air header quality. The compressed air system air receiver tanks are blown down on a weekly basis.

The plant compressed air system, containment compressed air system and Diesel Generator compressed air sub system air receiver tanks are subject to a New Hampshire State inspection, which is a visual inspection of the (1) vessel internal for structural integrity, (2) the code stamp and (3) relief valve. The inspection removes the tank access covers for internal tank inspection.

The system operating parameters trended by the System Engineer include the instrument air and containment compressed air discharge header pressures, containment header and instrument air header dew points, air compressor operating parameters, and air dryer operating parameters.

The annual testing results are analyzed to verify that the performance of the system is in accordance with its intended function.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M24.

Exceptions to NUREG-1801

None

Enhancements

The following enhancement will be made prior to entering the period of extended operation.

1. An annual air quality test requirement will be added to ensure compliance with air quality standards for the Diesel Generator compressed air sub system.

   *Program Elements Affected: Element 1 (Scope of Program), Element 2 (Preventive Actions), and Element 3 (Parameters Monitored/Inspected), Element 4 Detection of Aging Effects), and Element 6 (*Acceptance Criteria)

Operating Experience

The following examples of operating experience provide objective evidence that the Seabrook Station Compressed Air Monitoring Program is effective in ensuring that intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

1. Investigation of the failure of a containment air compressor in Feb. 2001 identified rust on the compressor cylinder in the area of the piston and rider rings. The rust was caused by condensation that formed in the compressor cylinder from the Primary Component Cooling Water system piping when the compressor was shutdown. In addition to rebuilding the compressor, operations procedures were revised to isolate Primary Component Cooling

Water to the containment air compressors when that compressor is shutdown.

2. In August 2006, a minor secondary plant transient occurred at Seabrook Station due to an air leak in the tubing to a Heater Drain System level control valve. The leak developed due to fretting of the instrument tubing in a stainless steel support clamp. As part of the corrective actions, guidance and operating experience was added to system walkdown guidelines to look for fretting of tubing in supports. A material change from copper to stainless steel for smaller instrument lines was also added to maintenance procedures. Walkdowns of critical air-operated valves in high risk systems were completed for extent of condition. All of the required actions to prevent recurrence have been completed.

3. Seabrook Station reviewed industry operating experience presented in the 2007 INPO Digest *"Recent Experiences Involving Instrument Air Line Failures"* for applicability. The operating experience discussed the failure of an Instrument Air line due to poor workmanship in soldering the copper pipe in the Instrument Air header during initial plant construction. Seabrook Station's piping specification does not allow for soldered joints in Instrument Air piping. Connections must be welded or threaded. The Seabrook Station piping specification requires the 2-inch and 3-inch air headers to be fabricated from carbon steel. Smaller piping downstream of the duplex filters is red brass. Instrument tubing, 1/2-inch or smaller, is either copper or stainless steel. The Instrument air piping and tubing is inspected during system walkdowns. An ultrasonic leak detector has been used to inspect for air leakage. Regularly performed system walkdowns have been performed to identify any system air leakage and corrective actions were initiated to correct any identified leakage.

4. Industry operating experience documented a failure of instrument air un-annealed red brass piping at a nuclear facility in March 2008. The cause of the failure was determined to be stress corrosion cracking due to exposure to ammonia or sulfur during fabrication or construction process.

   The instrument air system piping at Seabrook Station is constructed of either A-106 Grade B carbon steel, or ASTM B-43 red brass, per the piping specification. Typically, carbon steel pipe was used for the larger air headers upstream of the duplex filters, and red brass pipe was used for the 1-inch lines downstream of the duplex filters, up to the point where the line size is reduced to tubing. Per ANSI B31.1, the B-43 red brass material is annealed.

   Failures of the red brass piping (longitudinal cracks) were experienced at Seabrook Station in the early 1990's. The failed piping was analyzed and found to not have been properly annealed. The cause of the failure was attributed to stress corrosion cracking, which may occur when the improperly annealed piping is exposed to ammonia or sulfur-based compounds during fabrication or construction process. All cracks identified were from the outside diameter of the pipe.

As a corrective action, all red brass piping that was in stock (not installed) at the time was disposed of, and proper annealing requirements were specified for all replacement piping. Engineering review concluded that wholesale replacement of all the installed red brass piping was not warranted, as none of the piping failures were catastrophic and air flow to end users was not interrupted. In the case that any piping failures should result in an increased air load exceeding the capacity of the operating air compressor, the Instrument Air system is designed with multiple redundant compressors that will auto-start on a reduction in air pressure.

5. A self assessment of the compressed air monitoring system was completed by Seabrook Station in June 2008 to ensure completeness and proper documentation. The self assessment determined that previously performed response actions for key recommendations were determined to be adequate and that the required maintenance and air quality testing were being performed as specified. This self assessment and corrective action to ensure that commitments are protected served to document that the commitments made in the response to SOER 88-01 are in place and have been effective.

As demonstrated in the operating experience examples above, the Seabrook Station Compressed Air Monitoring Program is effectively managing the aging effects. Conditions identified would not have caused significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. There is sufficient confidence that the implementation of the Compressed Air Monitoring Program will effectively identify degradation prior to failure. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The previous examples of operating experience provide objective evidence that the Seabrook Station Compressed Air Monitoring Program is effective in ensuring that intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

Conclusion

The Seabrook Station Compressed Air Monitoring Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.15 FIRE PROTECTION

Program Description

The Seabrook Station Fire Protection Program is an existing program that manages the effects of aging on fire protection and suppression components through detailed inspections in accordance with the Seabrook Station Surveillance Test Procedures. Specifically, the program manages the following aging effects: (a) cracking due to restraint, shrinkage, creep, and aggressive environment, (b) cracking, loss of bond, loss of material (spalling, scaling) due to corrosion of embedded steel, (c) expansion and cracking due to reaction with aggregates, (d) increased hardness, shrinkage, and loss of strength due to weathering, (e) increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack, and (f) loss of material due to, general, pitting, crevice, galvanic, microbiologically influenced corrosion, abrasion, flaking, fouling, and wear of fire protection and suppression components. Age-related degradation of the diesel-driven fire pump's fuel oil supply line is managed through regularly scheduled fire pump performance tests.

Seabrook Station does not use a CO_2 Fire Suppression System. The Halon Fire Suppression System is used in a non safety-related Computer Room in the Control Building and therefore is not in-scope for License Renewal.

The Seabrook Station Fire Protection Program is an existing program that is included in the Seabrook Station Fire Protection Manual. The program provides for managing aging of the penetration seals, fire barrier walls, ceilings and floors and all fire rated doors (automatic or manual) that perform a fire barrier function. The program also manages the aging effects on the intended function of the fuel supply line to the Diesel Fire pumps.

The Fire Protection Evaluation and Comparison to BTP APCSB 9.5-1, Appendix A and Safe Shutdown Capability Report Appendix R quantifies the combustible loading and assesses the fire severity for all plant fire areas.

The Seabrook Station Administrative Procedure for Fire Protection Maintenance and Surveillance Testing incorporates activities that serve to prevent, detect or manage aging of the Fire Protection System. These include regular inspections of fire barriers, penetration seals, and fire rated doors. Performance tests and flushes are performed on fire pumps. These inspections and tests ensure that aging related degradation will be detected in its early stages in order to prevent loss of intended function.

Procedures are established to test and inspect penetration seals, fire barriers, fire doors, and diesel-driven fire pumps for indications of degradation. The Seabrook Station Fire Protection Program activities monitor a variety of parameters to prevent loss of intended function due to age-related degradation prior to loss of intended function. These parameters include:

Penetration Seals

Fire rated assembly penetration seals are inspected every 18 months. Seabrook Station procedural guidelines specify visual inspection of 10% of the Technical Requirement fire rated penetration seals within each category of seals for signs of deficiencies and degradation such as cracking, seal separation from walls and components, separation of layers of material, and rupture and puncture of seals, which are directly caused by increased hardness and shrinkage.

Such Within each seal category, if non-functional penetration seals resulting from deterioration are found, an additional 10% of that category are sampled and inspected.

Fire Barriers walls, floors and ceilings

Fire rated assembly exposed surfaces (barrier walls, floors, and ceilings) are inspected every 18 months. Seabrook Station procedural guidelines specify visual inspection of fire barriers by a fire protection qualified inspector for signs of degradation such as cracking, spalling, and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates.

Fire Doors

The Seabrook Station procedure requires surveillance and post maintenance inspection of technical requirements fire rated doors every 6 months and ensures that fire rated doors will be inspected for clearance (gaps) and wear, missing parts on automatic closer mechanisms and latches by a fire protection qualified inspector. The inspections will detect degradation before there is a loss of intended function.

Diesel-Driven Fire Pump

The Seabrook Station procedure requires performance of a flow capacity check on both the “A” and “B” Diesel Fire Pumps every 18 months. The performance of the fire pumps is monitored during testing in order to detect any degradation on the fuel supply line. The Diesel Fire Pumps operation procedure documents test data. If the test data exceeds the acceptance criteria, corrective action will be taken and trended as necessary. The tests will detect degradation before there is a loss of intended function.

Acceptance criteria are defined in the Seabrook Station procedures used to perform tests and inspections of the Fire Protection System. Fire penetration seal inspection results are acceptable if there are no visual indications (outside those allowed by approved penetration seal configurations) of cracking, separation of seals from building structures and components, and no rupture or puncture of seals. Fire barrier inspection results are acceptable if there are no visual indications of cracking, spalling and loss of material caused by freeze-thaw, chemical attack and reaction with aggregates. Fire door inspection results are acceptable if there are no visual indications of wear, holes, damaged or missing parts, and clearances are within limits. Diesel-driven fire pump inspections are acceptable if there is no evidence of loss of material or leaks on the fuel oil supply line. Acceptance criteria for diesel-driven fire pump capacity are contained within the test procedure.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M26.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be made prior to entering the period of extended operation.

1. The Seabrook Station Fire Protection Program implementing documents will be enhanced to perform visual inspection of penetration seals by a fire protection qualified inspector.

   Program Elements Affected: Element 4 (Detection of Aging Effects)

2. The Seabrook Station Fire Protection Program implementing documents will be enhanced to include specific age related degradation and inspection qualification as follows:

   a. Enhance existing inspection requirements to list additional age related degradation such as spalling and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates.

   b. Enhanced to perform visual inspection of fire-rated exposed surfaces (Barrier walls, floors and ceilings) by a fire protection qualified inspector.

   Program Elements Affected: Element 3 (Parameters Monitored/Inspected) and Element 4 (Detection of Aging Effects)

3. The Seabrook Station Fire Protection Program implementing documents will be enhanced to perform visual inspection of fire-rated doors by a fire protection qualified inspector.

   Program Elements Affected: Element 4 (Detection of Aging Effects)

Operating Experience

Seabrook Station has a comprehensive Operating Experience Program that monitors industry issues/events and assesses these for applicability to its own operations. In addition, the Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues/events. Preventive Maintenance Work Orders are used for tracking, identifying, and repairing any minor repairs needed to Fire Protection systems, structures and components identified during surveillances. Those issues and events, whether external or plant specific, that are potentially significant to fire protection at Seabrook Station are evaluated.

The Fire Protection Program has been rigorously inspected through various audits such as NRC Triennial Inspections, Nuclear Oversight audits and Quarterly Health Performance Reports listed below are some results of these audits.

1. In September 2002, during surveillance testing of the diesel driven fire pump, a leak was identified on the pump casing vent. The pump was stopped and a work order was issued to repair the leak. This example provides objective evidence that the Fire Protection program satisfactorily identifies degraded conditions in fire suppression systems and that deficient conditions are entered into the Corrective Action Program and corrected.
2. In October 2002, during a surveillance activity, two degraded Appendix R fire barriers were identified. Work orders were issued to repair the two barriers. This example provides objective evidence that during surveillance activities, deficient conditions are identified, entered into the Corrective Action Program, and corrected.
3. In April 2003, a broken door handle was identified on an Appendix R fire door. A work order was issued to repair and retest the door. This example provides objective evidence that the Fire Protection program satisfactory identifies deficient fire door conditions; the deficient condition was entered into the Corrective Action Program and was corrected.
4. In February 2008, an Appendix A fire door was identified as not latching completely and as difficult to open. A work order was issued to repair and retest the door. This example provides objective evidence that the Fire Protection program satisfactory identifies deficient fire door conditions; the deficient condition was entered into the Corrective Action Program and was corrected.

5. The NRC Triennial Fire Inspection Report dated 07/31/2008 identified no findings of significance.

6. A Nuclear Oversight audit report dated 12/7/09 concluded that on an overall basis, the Fire Protection Program was being effectively implemented. Findings were identified related to Combustible Material Controls, Area Pre Fire Strategies, documentation of Action Requests,, and Remote Safe Shutdown Panel equipment tagging. None of these findings were related to managing the effects of aging in the Fire Protection system.

7. Review of the Fire Protection Quarterly System Health Reports for 2009 indicated that the overall system performance was acceptable, with low significance findings related to manpower, design, and fire alarms. None of these findings were related to managing the effects of aging in the Fire Protection system.

In summary, Seabrook Station routinely evaluates NRC and industry communications on fire protection issues for applicability. The Station also initiates and evaluates condition reports during Seabrook Station Fire Protection Program Surveillances and through the Seabrook Station Corrective Action Program

Conclusion

The Seabrook Station Fire Protection Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.16 FIRE WATER SYSTEM

Program Description

The Seabrook Station Fire Water System Program is an existing program that manages the effects of aging on Fire Water System components through detailed inspections in accordance with the Seabrook Station Surveillance Test Procedures. Specifically, the program manages the following aging effects: (a) loss of material due to general, crevice, pitting, galvanic, and microbiologically influenced corrosion, (b) fouling, and (c) reduction of heat transfer due to fouling of the Fire Water System components..

Fire Water System components are tested in accordance with the applicable National Fire Protection Association codes and standards. The water supply for the plant Fire Protection system is obtained from two 500,000-gallon heated water storage tanks, of which 300,000 gallons in each tank is reserved for fire protection. Domestic water from the town of Seabrook is used to fill the fire water tanks. A metering pump automatically injects sodium hypochlorite into the fire water tank fill line as required. Water for fire protection is supplied to the system by one motor-driven fire pump and one diesel-driven pump. A second diesel-driven fire pump is provided as a spare. Each pump is capable of taking suction from either tank.

Two motor-driven jockey pumps maintain the fire system pressure, and prevent unnecessary starting of the main fire pumps. System operating pressure is monitored continuously and low pressure is alarmed in the Control Room.

Systems, structures and components included within the scope of the Seabrook Station Fire Water System Program include both fire suppression and fire mitigation components. The program focuses on managing loss of material due to corrosion, microbiologically influenced corrosion, or biofouling of copper alloy, copper alloy > 15% Zn galvanized steel, stainless steel, steel and gray cast-iron components exposed to water, and age-related degradation of components.

The Seabrook Station Fire Water System Program manages aging of the following system components: sprinklers, nozzles, fittings, filters, valves, hydrants, hose stations, flow gages and flow elements, pumps, standpipes, aboveground and underground Piping and Components, water storage tanks and heat exchangers.

The Seabrook Station Fire Protection Manual incorporates many activities that serve to prevent or manage aging of the Fire Water System. These include regular inspections of the Fire Water components, periodic flushing, system performance testing and inspections are conducted to ensure no significant corrosion, microbiologically influenced corrosion or biofouling has occurred in the Fire Water System.

The Seabrook Station Chemistry Manual provides method and directions for adding chemicals to plant systems in order to prevent microbiological growth, inhibit scale formation, dispense solids contained in water, improve chlorination efficiency, and maintain pH level to prevent corrosion of piping and components, including the Fire Water Tanks.

Seabrook Station procedures require the performance of visual inspection of all spray or sprinkler headers for damage and obstruction, visual inspection of dry pipe spray and sprinkler systems for integrity and obstruction, and auto initiation of deluge and preaction sprinkler valves.

Procedures are established to test and inspect fire protection piping and components for indications of degradation. The Fire Water System Program will be enhanced to perform periodic flow testing of the fire water system in accordance with National Fire Protection Association (NFPA) 25 guidelines.

Seabrook Station procedures provide guidance to flush external ring header of the fire suppression water system and to simultaneously conduct the hydraulic performance test. Flushing the header reduces the possibility of corrosion, microbiologically influenced corrosion, and biofouling, which prevents pipe wall thickness reduction.

Seabrook Station procedures require the performance of periodic flow tests to verify required operating pressure and visual inspection for corrosion, deterioration and or damage for all Fire Water Sprinkler System piping and components. Fire Protection System buried pipes are either polyvinylchloride or carbon steel pipe with an internal cement liner and a coal tar epoxy coating on the exterior. Seabrook Station procedures require the performance of a thorough inspection of all internal parts including corrosion and replace any worn or damaged parts.

The Seabrook Station Aboveground Steel Tanks Program, B.2.1.17, includes required inspections of the fire water tanks and fire protection fuel oil tanks.

Seabrook Station procedures require the performance of a visual inspection of fire hose houses, an inspection to ensure required equipment is present at each hose house, a hydrant inspection and operability test, a fire hydrant hose hydrostatic tests, and a hose replacement and gasket inspection and replacement monthly, semi-annually and annually.

Seabrook Station procedures require the performance of cleaning and a tube inspection of the Fire Pump House Heat Exchangers.

Acceptance criteria are defined in the Seabrook Station procedures used for performing tests and inspections of the Fire Water System Program. Sprinkler inspections are acceptable if there is no indication of biofouling in the sprinkler system. Piping inspections and tests are acceptable if there are no indications of unacceptable signs of degradation such as corrosion, microbiologically influenced corrosion or biofouling and that the fire protection system is able to maintain required pressure. Hydrant inspections are acceptable if there is no indication of degradation, such as corrosion.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M27.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be made prior to entering the period of extended operation.

1. The Seabrook Station Fire Water System Program will be enhanced to include NFPA 25 criteria for "*where sprinklers have been in place for 50 years, they will be replaced or representative samples from one or more sample areas will be submitted to a recognized testing laboratory for field service testing*". This sampling will be performed every 10 years after the initial field service testing to ensure that signs of degradation, such as corrosion, are detected in a timely manner.

   Program Elements Affected: Element 4 (Detection of Aging Effects)

2. The Seabrook Station Fire Water System Program will be enhanced to include the performance of periodic flow testing of the fire water system in accordance with NFPA 25 guidelines.

   Program Elements Affected: Element 3 (Parameters Monitored/Inspected)

3 The Seabrook Station Fire Water System Program will be enhanced to include the performance of periodic visual inspection or volumetric inspection, as required, of the internal surface of the fire protection system upon each entry to the system for routine or corrective maintenance to evaluate wall thickness and inner diameter of the fire protection piping. This inspection will be performed no earlier than 10 years before the period of extended operation.

   Program Elements Affected: Element 4 (Detection of Aging Effects)

Operating Experience

Both the industry and NRC have revealed a number of instances of potential problems with sprinklers and hydrants. Seabrook Station has a comprehensive Operating Experience Program that monitors industry issues/events and assesses these for applicability to its own operations. In addition, the Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues/events.

The Fire Water System is audited along with the Fire Protection Program. The program has been rigorously inspected through various audits such as NRC Triennial Inspections, Quality Assurance Department audits and Quarterly System Health Reports. Review of recent operating experience revealed the following:

1. In July 2003, a surveillance activity identified a failure to develop required discharge pressure for the Fire Protection Booster Pump (1-FP-P-374).

Engineering evaluation concluded the pump sizing requirement assumptions were incorrect and re-calculated pump design requirements. An engineering change document was developed to replace the pump impeller to increase total design head. In February 2004 the pump impeller was replaced and the surveillance was re-run with acceptable results. This operating experience provides objective evidence that routine system surveillances discover deficient conditions that are evaluated and corrected per the Corrective Action Program.

2. In July 2004, while performing maintenance on a leaking valve, a maintenance mechanic observed pipe corrosion in the fire pump recirculation header. The mechanic wrote a work order and the pipe was replaced in November of 2005. This example provides objective evidence that through routine system maintenance and inspections, conditions on the Fire Water System piping are monitored, degraded conditions are discovered, and identified deficient conditions are properly repaired and entered into the Corrective Action Program.

3. In September 2006, a section of 4 inch Fire Protection piping that was removed to facilitate installation of a Feedwater spool was found to have significant pitting inside the pipe. Subsequently, engineering performed a visual inspection of the removed piping section (approximately 21 feet) and found the pitted area was approximately 1 inch x 3/8 inch at one end of the removed pipe. It was recommended that the entire piping section be replaced and reinstalled. The pitting appeared to be an isolated case. Based on the service condition and the water being used, no other corrective actions were required. This example provides objective evidence that through routine system maintenance and inspections, conditions on the Fire Water System piping are momitored, degraded conditions are discovered, and identified deficient conditions are properly repaired and entered into the Corrective Action Program.

4. The NRC Triennial Fire Inspection Report dated 07/31/2008 identified no findings of significance.

5. A Nuclear Oversight audit report dated 12/7/09 concluded that on an overall basis, the Fire Protection Program was being effectively implemented. Findings were identified related to Combustible Material Controls, Area Pre Fire Strategies, documentation of Action Requests, and Remote Safe Shutdown Panel equipment tagging. None of these findings were related to managing the effects of aging in the Fire Water system

6. Review of the Fire Protection Quarterly System Health Reports for 2009 indicated that the overall system performance was acceptable, with low significance findings related to manpower, design, and fire alarms. These

findings have no impact on managing the effects of aging in the Fire Water System.

Conclusion

The Seabrook Station Fire Water System Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.17 ABOVEGROUND STEEL TANKS

Program Description

The Seabrook Station Aboveground Steel Tanks Program is an existing program that manages the aging effects of loss of material due to general, pitting, and crevice corrosion for aboveground steel tanks within the scope of License Renewal. The Program includes preventive measures to mitigate corrosion and periodic inspections to validate the effectiveness of the preventive actions.

The Seabrook Station Program utilizes the application of protective coatings on the exterior surfaces of the in-scope steel tanks to protect from environmental factors. To ensure that the exterior surfaces of the tanks remain protected, the protective coatings are visually inspected in accordance with the Seabrook Station Structures Monitoring Program.

Inaccessible locations, such as a tank bottom, are surveyed by ultrasonic thickness measurements from inside the tank to detect any exterior material degradation. The ultrasonic thickness measurements of fuel oil tanks within the scope of this program will be performed in accordance with the Seabrook Station Fuel Oil Chemistry Program, Section B.2.1.18. In addition, the structural integrity of the tank foundations and anchor bolts is managed by the Seabrook Station Structures Monitoring Program, Section B.2.1.31.

Caulking and flashing are applied along the tank and ground interface of the Auxiliary Boiler fuel oil storage tank and the two Fire Protection water storage tanks. The tanks are on concrete foundations with a compacted oiled sand foundation. The two diesel fire pump fuel oil tanks are raised on steel supports, clear of their concrete foundations.

Inspections of protective coatings are performed and any degradation of paint, coating, sealant, and caulking is reported through the corrective action system for evaluation. This evaluation assesses and reports the extent of any degradation - cracking, flaking, or peeling of paint, or drying, cracking or missing sealant and caulking.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M29.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be made prior to entering the period of extended operation.

1. Enhance the Seabrook Station Aboveground Steel Tanks Program implementing procedures to:

    a) Include the Fire Protection Fuel Oil Tanks, Auxiliary Boiler Fuel Oil Storage Tank, and Fire Protection Water Storage tanks as part of the scope of tanks.

    b) Add paint flaking and drying, cracking, or missing sealant and caulking as examples of minor structural deficiencies.

    c) Add a requirement that discrepant conditions be reported through the station Corrective Action Program.

    Program Elements Affected: Element 1 (Scope of Program), Element 3 (Parameters Monitored/Inspected), Element 4 (Detection of Aging Effects), Element 5 (Monitoring and Trending,) and Element 6 (Acceptance Criteria)

2. Enhance the Seabrook Station Aboveground Steel Tanks Program implementing procedures to require the performance of an ultrasonic examination and evaluation of the internal bottom surface of the two Fire Protection Water Storage Tanks within 10 years prior to the period of extended operation.

    Program Elements Affected: Element 1 (Scope of Program), Element 3 (Parameters Monitored/Inspected), Element 4 (Detection of Aging Effects), Element 5 (Monitoring and Trending), and Element 6 (Acceptance Criteria)

Operating Experience

Seabrook Station has a comprehensive Operating Experience Program that monitors industry issues/events and assesses these for applicability to its own operations. In addition, the Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues/events. Preventive Maintenance work orders are used for tracking, identifying, and repairing Aboveground Steel Tanks during surveillances. Those issues and conditions, whether external or plant specific, that are potentially significant to the Aboveground Steel Tanks at Seabrook Station are evaluated.

Seabrook Station has encountered minor exterior coating degradation on tanks within the scope of License Renewal, as noted from a screening of the Corrective Action Program and work control data bases. Periodic inspections, followed by any necessary corrective actions, have assured the continued capability of the tanks to perform their intended functions.

The aging management activities that have been applied to aboveground steel tanks at Seabrook Station include:

1. In 1995, three large above ground steel tanks, the Auxiliary Boiler Fuel Oil Storage Tank and Fire Protection Water Storage Tanks “A” and “B” were totally reconditioned to ensure their continued resistance to environmental factors that could lead to degradation and loss of function.

2. In September 1999, degradation of coatings was reported on Fire Protection Fuel Oil Tanks “A” and “B”. The tanks were surface prepped and re-coated to an upgraded condition.

3. In May 2001, in response to a condition of chipped paint and exposed, rusting surface metal around the lower manways of the Fire Protection Water Storage Tank “A”, a work order was initiated. As part of the remedial work, Fire Protection Water Storage Tank “B” was surveyed and found to have a similar condition. Both tanks were surface prepped and re-coated to effect a repair that would maintain the structural integrity of the tank.

4. In June 2001, an inspection of the internal bottom surface of the Auxiliary Boiler Fuel Oil Storage Tank (1-AB-TK-29) was performed by certified personnel under a work order and in accordance with *“Specification for Cleaning, Inspection and Repair of Bulk Fuel Oil Storage Tank 1-AB-TK-29 for North Atlantic Energy Co.”* Inspection results were captured in a report titled, *“Technical Inspection & Engineering Analysis Report”*. The report indicated minimal thickness loss on the nominal ¼” thick floor after 26 years. No degradation of the tank floor was characterized as major.

The above examples demonstrate that the Seabrook Station Aboveground Steel Tanks Program is effective in managing the aging affects during the period of extended operation.

Conclusion

The Seabrook Station Aboveground Steel Tanks Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.18 FUEL OIL CHEMISTRY

Program Description

The Seabrook Station Fuel Oil Chemistry Program is an existing program that manages the aging effects of loss of material due to general, pitting, crevice, galvanic, and microbiologically influenced corrosion, and due to fouling in the diesel fuel oil systems for the Emergency Diesel Generators, diesel engine driven Fire Protection system pumps, and the Auxiliary Boiler fuel oil system, through monitoring and maintenance of diesel fuel oil quality. The program complies with the Seabrook Station Technical Specifications and associated Technical Requirements.

This program manages aging effects for the Diesel Generator Fuel Oil Storage Tanks (1-DG-TK-26A & B), the Diesel Generator Fuel Oil Day Tanks (1-DG-TK-78A & B), the Diesel Fire Pump Fuel Oil Day Tanks (1-FP-TK-35A & B) and the Auxiliary Boiler Fuel Oil Storage Tank (1-AB-TK-29) and the associated piping, tubing and valves. By maintaining fuel oil chemistry, removing water and cleaning and inspecting the tanks, this program manages the aging effects to these components.

Seabrook Station monitors new fuel oil deliveries to ensure they meet the requirements of Technical Requirements Program 5.1, "*Diesel Fuel Oil Testing Program*," and Technical Requirement 7, *"Fire Suppression Water System,"* when they are added to the Diesel Generator Fuel Oil Storage Tanks and Diesel Fire Pump Fuel Oil Day Tanks.

New fuel oil samples are taken in accordance with ASTM D4057*, "Standard Practice for Manual Sampling of Petroleum and Petroleum Products"* guidelines. The sample is verified to meet the requirements of applicable ASTM standards prior to offloading to the applicable storage tank.

Seabrook Station uses ASTM Standards D4176, *"Standard Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)"* and D2709, *"Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge"*, for the determination of water and sediment contamination in diesel fuel as specified by Seabrook Station Technical Requirements, and uses the non-modified ASTM D2276, *"Standard test Method for Particulate Contaminant in Aviation Fuel by Line*

Sampling" for measurement of particulates. Fuel oil sampling and analysis is performed in accordance with approved procedures for new fuel and stored fuel.

Checking for the presence of water and removing water, as necessary, eliminates the necessary environment for bacterial survival. Seabrook Station Technical Requirements require that the Diesel Generator Fuel Oil Storage Tanks and the Diesel Generator Fuel Oil Day Tanks are checked for the presence of water every 31 days and water is removed as necessary. Technical Requirement 7 requires that the Diesel Fire Pump Fuel Oil Day Tanks are checked for the presence of water at least once every 92 days and water is removed as necessary. The Auxiliary Boiler Fuel Oil Storage Tank is checked for the presence of water at least once per quarter and water is removed as necessary.

Biological growth and loss of material due to corrosion require the presence of a water interface, therefore the monitoring for and draining of water from the tanks will mitigate the related aging effects. Microbiological organisms are identified as part of the periodic particulate (water/sediment) testing for fuel oil storage tanks. If microbiological organisms are identified as part of the particulate analysis, appropriate actions will be taken as identified during the corrective action evaluation. The Technical Specification surveillance test procedures for fuel oil prescribe that if any values are outside of procedural limits, actions to restore the values to within limits will be immediately initiated.

Stability additives and corrosion inhibitors are not added to fuel oil at Seabrook Station based on the turnover rate, new fuel quality and periodic monitoring of the fuel oil storage tanks. A microbiocide is added to the Diesel Generator Fuel Oil Storage Tanks and monitored quarterly. Biocides are not added to the other tanks as a standard practice. Seabrook Station procedures allow for fuel oil stabilizers to be added to the Diesel Generator fuel oil storage tanks to improve fuel quality during long term storage.

Seabrook Station monitors fuel oil quality and the levels of water in the fuel oil, which cause the loss of material of the tank internal surfaces. The ASTM Standard D4057 is used for guidance in the Seabrook Station fuel oil sampling procedure.

Seabrook Station uses ASTM Standards D4176, *"Standard Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)"* and ASTM D2709, *"Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge"* for determination of water and sediment contamination in diesel fuel as specified by Seabrook Station Technical Requirements.

Seabrook Station uses the non-modified ASTM D2276 for particulate testing. This method uses a 0.8 µm filter pore size versus the 3 µm size described in the modified ASTM D2276, Method A. The smaller filter pore size allows collection of particulates indicating biological degradation that may be much smaller than 3 µm.

The Seabrook Station Fuel Oil Chemistry Program complies with applicable diesel fuel oil standards as defined by Technical Specifications and Technical Requirements and performs periodic multi-level sampling which provides reasonable assurance that fuel oil contaminants are within unacceptable levels

The Diesel Generator Fuel Oil Storage Tanks, Diesel Generator Fuel Oil Day Tanks, the Diesel Fire Pump Fuel Oil Day Tanks and the Auxiliary Boiler Fuel Oil Storage Tank are drained, cleaned and inspected on a frequency of at least once every ten years. This inspection includes ultrasonic thickness measurements of the tank bottom surface to ensure that degradation has not occurred.

A sample of components in systems that contain fuel oil will also be inspected for evidence of effective management of the aging effects of loss of material in accordance with the Seabrook Station One-Time Inspection Program (B.2.1.20).

The fuel oil analyses results for the fuel oil storage tanks and the new fuel tankers are documented and reviewed against acceptance criteria specified in the Chemistry Department procedures. New fuel deliveries are sampled and verified prior to off-loading the fuel to the storage tanks. The results are also logged in the Chemistry Department data management system to provide long term trending. The frequency of sampling and trending assure timely detection of conditions conducive to corrosion of the internal surface of the diesel fuel oil tanks before the potential loss of intended function.

NUREG-1801 Consistency

This program, with exceptions noted below, is consistent with NUREG-1801 XI.M30.

Exceptions to NUREG-1801

1. NUREG-1801 XI.M30 states *“The quality of fuel oil is maintained by additions of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and corrosion inhibitors to mitigate corrosion.”*

Seabrook Station does not use stabilizers or corrosion inhibitors in the diesel fuel oil. Biocide is added only to the Diesel Generator Fuel Oil Storage Tanks.

Justification for the Exception

Monthly testing for and removal of water and the purchase of quality fuel oil negates the need for stabilizers or corrosion inhibitors. Seabrook Station Operating Experience has shown this to be an acceptable alternative based on favorable sample results. New fuel oil is sampled from the delivery tanker per ASTM D4057 guidelines and the sample is verified to meet the requirements of applicable ASTM standards prior to offloading to the applicable storage tank. The program manages the aging effects of the components by maintaining fuel oil chemistry, removing any accumulated water, and cleaning and inspecting the tanks. These fuel oil storage tanks are periodically drained and inspected. The fuel oil is used and topped off often enough to negate the need for stabilizers or corrosion inhibitors.

Program Elements Affected: Element 2 (Preventive Actions).

2. NUREG-1801 XI.M30 states *"The ASTM Standards D1796 and D2709 are used for determination of water and sediment contamination in diesel fuel. For determination of particulates, modified ASTM D2276, method A is used. The modification consists of using a filter with a pore size of 3.0 µm, instead of 0.8 µm."*

   The Seabrook Station Fuel Oil Chemistry Program does not use modified ASTM D2276, *"Standard Test Method for Particulate Contaminant in Aviation Fuel by Line Sampling"* method A to sample for particulates.

   Justification for the Exception

   Seabrook Station uses the non-modified ASTM D2276 which uses a filter pore size of 0.8µm verses the 3.0µm as used by the Modified ASTM D2276, method A. The smaller pore size retains smaller particles and is a conservative practice since the analysis for particulates is based on the total weight of particulates captured.

   Program Elements Affected: Element 3 (Parameters Monitored/Inspected) and Element 6 (Acceptance Criteria).

3. NUREG-1801 XI.M30 states *"The ASTM Standards D1796 and D2709 are used for determination of water and sediment contamination in diesel fuel."*

Seabrook Station does not use ASTM D1796, *"Standard Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure)"*, for determination of water and sediment in diesel fuel due to the type of fuel.

<u>Justification for the Exception</u>

Seabrook Station uses the ASTM Standard D4176, *"Standard Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)"* as well as ASTM D2709, *"Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge"* for determination of water and sediment contamination in diesel fuel as specified by Seabrook Station Technical Requirements. ASTM Standard D2709 is for testing of middle distillate fuels and ASTM Standard D1796 is for fuel oils. Both are standards for laboratory testing for water and sediment. By contrast, Seabrook Station uses ASTM Standard D4176 to perform a Clear and Bright Test of Light Fuel Oil and only ASTM Standard D2709 is used for determination of water and sediment contamination as part of a lab test. The clear and bright test can be performed in the field as well as in the lab and is an easy first screening to determine quality of the fuel oil. Seabrook Station has determined that using one lab test to analyze for water and particulate coupled with the field clear and bright test provides an acceptable approach for detecting water and particulates in the delivered Diesel Generator Fuel Oil.

Program Elements Affected: Element 3 (Parameters Monitored/Inspected) and Element 6 (Acceptance Criteria)

Enhancements

The following enhancements will be made prior to entering the period of extended operation.

1. The Seabrook Station Fuel Oil Chemistry Program will be revised to include requirements to

    a. Sample and analyze new fuel deliveries including testing for biodiesel prior to offloading to the auxiliary boiler fuel oil storage tank.

    b. Periodically sample stored fuel in the Auxiliary Boiler Fuel Oil Storage Tank.

    Program Elements Affected: Element 1 (Scope of Program), Element 2 (Preventive Actions), Element 3 (Parameters Monitored/Inspected), and Element 5 (Monitoring and Trending)

2. The Seabrook Station Fuel Oil Chemistry Program will be revised to include a requirement to check for the presence of water in the auxiliary boiler fuel oil storage tank at least once per quarter and to remove water as necessary.

   Program Elements Affected: Element 2 (Preventive Actions)

3. Seabrook Station Fuel Oil Chemistry Program will be revised to require draining, cleaning and inspection of the diesel fire pump fuel oil day tanks on a frequency of at least once every ten years.

   Program Elements Affected: Element 1 (Scope of Program), Element 2 (Preventive Actions), Element 3 (Parameters Monitored/Inspected), and Element 5 (Monitoring and Trending)

4. Seabrook Station Fuel Oil Chemistry Program will be revised to include ultrasonic thickness measurement of the tank bottom during the 10-year draining, cleaning and inspection of the Diesel Generator fuel oil storage tanks, Diesel Generator fuel oil day tanks, diesel fire pump fuel oil day tanks and auxiliary boiler fuel oil storage tank.

   Program Elements Affected: Element 2 (Preventive Actions) and Element 4 (Detection of Aging Effects)

Operating Experience

Seabrook Station has a comprehensive operating experience program that monitors industry issues/events and assesses these for applicability to its own operations. In addition, the Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues/events. Those issues and events, whether external or plant specific, that are potentially significant to the fuel oil systems at Seabrook Station are evaluated. The Seabrook Station Fuel Oil Chemistry Program is augmented, as appropriate, if these evaluations show that program changes will enhance program effectiveness.

1. In November 2000, a trend of increasing particulates was identified in Diesel Generator fuel oil storage tank, 1-DG-TK-26B. Test results from two samples showed particulate matter at 11.8 mg/L and 11.2 mg/L which exceeded the limit of 10 mg/L. As a corrective action, both Diesel Generator Fuel Oil storage tanks (1-DG-TK-26A and 26B) were filtered to a particulate matter of less than <0.3 mg/L. A condition report was written along with a work order to correct the issue. A cause analysis was performed. The cause analysis determined that a combination of factors were potential contributors to the high particulate count. Corrective actions included cleaning of the diesel generator day tanks at the next opportunity, more frequent replacement of the associated fuel oil filters (every 6

months), review the lube oil - fuel oil interfaces to rule out lube oil contamination of the fuel as a major contributor and to plan for future potential particulate clean-up activities. The plant did not experience a loss of intended function of the Diesel Generator due to the high particulate count.

2. A review of work orders associated with the cleaning and inspection of Diesel Generator fuel oil storage tanks and day tanks and the fire pump fuel oil day tanks indicate no degradation of the tanks. The "A" Diesel Generator fuel oil storage tank was drained and the bottom UT inspected in 1994 and 2003. The "B" Diesel Generator fuel oil storage tank was drained and the bottom ultrasonic inspection examination was performed on the tank bottom in 1994 and 2005. The "A" Diesel Generator fuel oil day tank was drained, cleaned and inspected in 2003. The "B" Diesel Generator fuel oil day tank was drained, cleaned and inspected in 2005.

3. In June 2001, an inspection of the internal bottom surface of the Auxiliary Boiler Fuel Oil Storage Tank (AB-TK-29) was performed by certified personnel under a work order and in accordance with a Seabrook Station specification for cleaning, inspection and repair of the bulk fuel oil storage tank. Inspection results were captured in a technical inspection and engineering analysis report. The report indicated minimal thickness loss on the nominal ¼" thick floor after 26 years. No degradation of the tank floor was characterized as major.

4. A review of Seabrook Station condition reports identified instances when the new fuel oil deliveries were rejected due to the presence of water.

   In December of 2004, a fuel shipment for the Emergency Diesel Generators did not meet the acceptance criteria of the clear and bright test. Samples were analyzed for water, particulate, and haze. Visible water droplets could be seen at the bottom of the clear and bright bottle. A second sample was taken and it also had visible water droplets in the sample bottle and therefore, the tanker fuel oil shipment was rejected.

   In September of 2005, a fuel shipment for the Emergency Diesel Generators did not meet the acceptance criteria for flashpoint. The flashpoint reading of 117°F was below the minimum requirement of 125°F and therefore, the tanker fuel oil shipment was rejected.

   In these instances corrective actions were taken to correct the out of specification condition prior to offloading the fuel oil into the Diesel Generator Fuel Oil Storage Tank.

5. Although not called out in NUREG-1801 XI.M30, the NRC has recently issued Information Notice 2009-02, "*Biodiesel in Fuel Oil Could Adversely*

Impact Diesel Engine Performance". This document indicates that No. 2 diesel fuel could contain up to a 5 percent bio-diesel fuel (B5) blend without labeling the blend in accordance with ASTM D 975-08a, *"Standard Specification for Diesel Fuel Oils"*. Bio-diesel B5 blend: (a) can have a cleansing effect that can increase sediment that could plug filters, (b) could form "*dirty water*" which leads to algae growth, (c) is biodegradable such that long term storage is not recommended and (d) can be more susceptible to gel creation in the presence of brass, bronze and copper fittings, piping and tanks. These effects could lead to plant specific operating experience outside the bounds of industry operating experience.

Existing Seabrook Station plant procedures test for bio-diesel prior to off-load of fuel oil to the Diesel Generator fuel oil storage tanks and fire pump fuel oil day tanks. Acceptance criteria for bio-diesel is <2% (non-detectable).

The operating experiences discussed above show examples of abnormal conditions that were identified by routine monitoring activities and corrective actions that were put in place to correct or prevent reoccurrence or proactive improvements to the program. The previous examples of operating experience provide objective evidence that the Seabrook Station Fuel Oil Chemistry Program will be effective in managing aging effects through the period of extended operation.

Conclusion

The Seabrook Station Fuel Oil Chemistry Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.19 REACTOR VESSEL SURVEILLANCE

Program Description

The Seabrook Station Reactor Vessel Surveillance Program is an existing program that manages the aging effect of loss of fracture toughness due to neutron embrittlement of the low alloy steel Reactor Vessel.

The extent of Reactor Vessel embrittlement for upper-shelf energy and pressure-temperature limits for 60 years is projected in accordance with the NRC Regulatory Guide (RG) 1.99, Revision 2, *"Radiation Embrittlement of Reactor Vessel Materials"*. Seabrook Station utilizes the NUREG-1801 methodology of projecting neutron embrittlement using surveillance data. Monitoring methods are in accordance with 10 CFR 50, Appendix H, *"Reactor*

Vessel Material Surveillance Program Requirements". Testing methods are in accordance with ASTM E 185-82, *"Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Power Reactors Vessels".*

The initial surveillance program for Seabrook Station was prepared by Westinghouse in 1983 and issued as WCAP-10110, *"Public Service Company of New Hampshire, Seabrook Station Unit No. 1, Reactor Vessel Radiation Surveillance Program".*

Aging effects are detected through testing of specimens from surveillance capsules that are periodically withdrawn from the vessel. Testing is performed to determine the increase in transition temperature, Reference Temperature – Nil Ductility Transition ($RT_{NDT)}$, and the decrease in upper shelf energy for materials that closely match Reactor Vessel beltline materials. Trending is accomplished utilizing RG 1.99 methods for projection of RT_{NDT} and upper shelf energy. Projection of the increase in RT_{NDT} and the decrease in upper shelf energy provides early indication of whether the fracture toughness properties of the Reactor Vessel beltline materials will fail to meet regulatory requirements.

Neutron embrittlement is evaluated through surveillance capsule testing and evaluation, fluence calculations and monitoring of effective full power years. All capsules pulled to date have met the testing and reporting requirements of ASTM E185-82.

Seabrook Station falls under the NUREG-1801 XI.M31 item 6 condition of having a surveillance program that consists of capsules with a projected fluence exceeding the 60-year fluence at the end of 40 years. The Seabrook Station Reactor Vessel Surveillance Program will withdraw one remaining capsule at an outage in which the capsule receives a neutron fluence that meets the schedule requirements of 10 CFR 50 Appendix H and ASTM E185-82 and that bounds the 60-year fluence and test the capsule in accordance with the requirements of ASTM E185-82. Any capsules remaining in the Reactor Vessel will be removed at that time unless determined that the capsule(s) might provide meaningful metallurgical data if left in place.

Although the regulatory requirements applicable to Reactor Vessel surveillance are not changed as a result of license renewal, several actions are required to show that regulatory requirements will continue to be met through the period of extended operation. For example, the neutron fluence projection used to determine compliance with the Pressurized Thermal Shock screening criteria of 10 CFR 50.61, *"Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events"*, must account for the additional effective full power years to be accrued during the period of extended operation.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M31.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be made prior to entering the period of extended operation.

1. The Seabrook Station Reactor Vessel Surveillance Program will be enhanced to specify that all pulled and tested capsules, unless discarded before August 31, 2000, are placed in storage.

   Program Elements Affected: Element 1 (Scope of Program)

2. The Seabrook Station Reactor Vessel Surveillance Program will be enhanced to specify that if plant operations exceed the limitations or bounds defined by the Reactor Vessel Surveillance Program, such as operating at a lower cold leg temperature or higher fluence, the impact of plant operation changes on the extent of Reactor Vessel embrittlement will be evaluated and the NRC will be notified.

   Program Elements Affected: Element 1 (Scope of Program)

3. The Seabrook Station Reactor Vessel Surveillance Program will be enhanced as necessary to ensure the appropriate withdrawal schedule for capsules remaining in the vessel such that one capsule will be withdrawn at an outage in which the capsule receives a neutron fluence that meets the schedule requirements of 10 CFR 50 Appendix H and ASTM E185-82 and that bounds the 60-year fluence, and the remaining capsule(s) will be removed from the vessel unless determined to provide meaningful metallurgical data.

   Program Elements Affected: Element 5 (Monitoring and Trending)

4. The Seabrook Station Reactor Vessel Surveillance Program will be enhanced to ensure that any capsule removed, without the intent to test it, is stored in a manner which maintains it in a condition which would permit its future use, including during the period of extended operation.

   Program Elements Affected: Element 5 (Monitoring and Trending)

Operating Experience

1. The first surveillance capsule, “U”, was removed from the Seabrook Station Reactor Vessel in August 1991 after 0.913 effective full power years of reactor operation. The second surveillance capsule, “Y”, was removed in May 1997 after 5.572 effective full power years of reactor operation. The third surveillance capsule, “V”, was removed in April 2005 after 12.39 effective full power years of reactor operation. The results of the capsule V analysis were submitted to the NRC as required by 10 CFR 50 Appendix H by WCAP-16526-NP *“Analysis of Capsule V from FPL Energy-Seabrook Unit 1 Reactor Vessel Radiation Surveillance Program”.* This report summarizes results from all three capsules (“U”, “Y”, and “V”) and the initial un-irradiated mechanical tests for comparison. Seabrook Station evaluation of these results is documented by an engineering evaluation and found that the Pressure/Temperature limit curves and Low Temperature Overpressure Protection set points remained valid for the 20 effective full power year period of applicability. All surveillance materials exhibited adequate upper shelf energy.

2. The Reactor Vessel lower shell plate material and beltline weld were included in the surveillance capsules as the limiting beltline materials in all three capsules. The radiation induced transition temperature shifts (delta RT_{NDT}) for the limiting plate and weld materials, from all three capsules, were within the standard two deviations of Regulatory Guide 1.99, Revision 2 predictions. The irradiated upper shelf energy values for the vessel weld metal and base materials samples were well in excess of the 50 ft-lb. lower limit for continued safe operation and are expected to be maintained above 50 ft-lbs. throughout vessel life as required by 10 CFR 50 Appendix G, *“Fracture Toughness Requirements”*.

3. Following removal of capsule “V” during Refueling Outage 10 (April of 2005), the surveillance capsule removal schedule was revised by UFSAR Change 06-019, “*Revise Reactor Vessel Surveillance Program Withdrawal Schedule*,” incorporating the actual capsule “V” fluence and effective full power years of exposure, and recommending that the extra capsules (“W” and “Z”) be withdrawn within one cycle of the removal of capsule “X”. This would allow for meaningful metallurgical data for approximating 60 years of plant operation. This change also recommended that these capsules be placed in storage upon removal.

4. In 2004, another nuclear facility found damage to the lower internals support flange and the surveillance capsule access plug in the lower internals flange. The surveillance capsule access plug appeared to have been partially tilted in its access hole when the upper internals were installed at a prior outage. The weight of the upper internals and Reactor

Vessel head, combined with the bolted closure force to crush the access plug to the height of the lower internals hold down spring. A review of this operating experience identified a similarity between the Seabrook Station Reactor Vessel surveillance capsule access plug locations and those at the other facility. The applicable Seabrook Station maintenance procedure was revised to address verifying with an underwater camera, that the surveillance capsule access plugs are in their proper location and seated flat against the flange prior to installing the upper internals as part of fuel loading. Although this event was not aging related, this example demonstrates the rigor that Seabrook Station maintains in responding to industry operating experience that could impact the Seabrook Station Reactor Vessel Surveillance Program.

These examples of Seabrook Station operating experience provide evidence that the current Reactor Vessel Surveillance Program is adequately monitoring the aging effect of loss of fracture toughness due to neutron embrittlement of the low alloy steel Reactor Vessel, and that Seabrook Station is maintaining an awareness and sensitivity to operating experiences throughout the industry that could impact this program.

Conclusion

The Seabrook Station Reactor Vessel Surveillance Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation.

B.2.1.20 ONE-TIME INSPECTION

Program Description

The Seabrook Station One-Time Inspection Program is a new program. This program addresses potentially long incubation periods and provides a means of verifying that aging effects are either not occurring or are progressing so slowly as to have negligible effect on the intended function of the structure or components through the period of extended operation. The Seabrook Station One-Time Inspection Program provides measures for verifying that an aging management program is not needed, for verifying the effectiveness of an existing program, or for determining that degradation is occurring which will require evaluation and corrective action.

The program elements include (a) determination of appropriate inspection sample size, (b) identification of inspection locations, (c) selection of examination techniques, including acceptance criteria, and (d) evaluation of results to determine the need for additional inspections or other corrective actions. The inspection sample includes locations where the most severe aging effect(s) would be expected to occur. Inspection methods may include visual (or remote visual), surface or volumetric examinations, or other established nondestructive examination techniques.

This Program will be used to:

- Verify the effectiveness of the Seabrook Station Water Chemistry Program (B.2.1.2) for managing the aging effects in portions of piping and components exposed to a treated water environment.

- Verification of the effectiveness of the Seabrook Station Fuel Oil Chemistry Program (B.2.1.18) for managing the aging effects of piping and components in systems that contain fuel oil.

- Verification of the effectiveness of the Seabrook Station Lubricating Oil Analysis Program (B.2.1.26) for managing the aging effects of piping and components in systems that contain lube oil.

This program will perform a one-time inspection of selected components determined to be most susceptible to the potential degradation mechanisms. The components to be inspected will be chosen from the systems within the scope of the Seabrook Station Water Chemistry Program, Seabrook Station Fuel Oil Chemistry Program, and the Seabrook Station Lubricating Oil Analysis Program. From these groups of components, a sample of the population will be selected for inspection as part of the Seabrook Station One-Time Inspection Program. The inspection population will be based on such aspects of the systems and components as similarity of materials of construction, operating environment, and aging effects. The sample size will be based on such aspects of the systems and components as the specific aging effect, location, system, and structure design, materials of construction, service environment, or previous failure history. The selection criteria will include stagnant or low-flow areas.

This program assesses aging effects of loss of material due to corrosion (general, pitting, crevice, or galvanic); loss of material due to microbiological influenced corrosion; loss of material due to fouling; reduction of heat transfer due to fouling; and cracking due to stress corrosion cracking and cyclic loading of susceptible components within License Renewal scope. This program will select the locations to be inspected, provide the inspection criteria, evaluate the results of the inspections and provide recommendations for additional inspections, as necessary. The results of these inspections will be evaluated for impact throughout the relevant systems at Seabrook Station. They will also determine the need for additional inspections to manage this aging effect.

The inspections will be scheduled as close to the end of the current operating license period as practical, with margin provided to ensure completion prior to commencing the period of extended operation. The inspection requirements may be satisfied by a review of repair or other inspection records to confirm that the component has been inspected for aging degradation and no significant degradation has occurred within ten years prior to the period of extended operation.

The Seabrook Station One-Time Inspection Program is intended to verify that aging degradation is either not occurring or is occurring at such a slow rate that the component or structure's intended function is not affected. By definition, the inspections are one-time, and therefore they do not include any methods to prevent or mitigate degradation.

The examination techniques will be visual, surface, volumetric, or other appropriately established non-destructive examination (NDE) methods. The NDE will be performed by qualified personnel following procedures consistent with ASME Code and 10 CFR 50, Appendix B, *"Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants"*.

Any indication or relevant conditions of degradation detected are evaluated. Acceptance criteria may be based on applicable ASME or other appropriate standards, design basis information, or vendor-specified requirements and recommendations.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.M32.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

There is no programmatic operating experience specifically applicable to the new one-time inspections. However, plant and industry operating experience will be considered in the selection of the initial component sample sets. The following examples demonstrate that the existing condition monitoring and condition reporting programs are effective in identifying, evaluating and correcting aging effects typical of the scope of this program.

1. In July of 2001, during replacement of Train "B" Service Water Cooling Tower pump with a new style pump, corrosion was observed on the pump discharge head flange. The discharge head was replaced with a more corrosion resistant material during the installation of the new style pump.

2. In February of 2002, two Service Air system receiver inlet isolation valves were scheduled for replacement due to seat leakage. When these valves were removed, corrosion was discovered inside the piping adjacent to the valves. Engineering was contacted to perform a minimum wall evaluation, which concluded that the measured wall thickness satisfied the piping system requirements for design pressure as well as mechanical loading.

   During internal inspection, a large amount of rust and scale was also found lying in the piping between the valves and the air receivers. All loose scale was removed from the tank and inlet piping. The inlet piping to this receiver was inspected by the system engineer and design engineering. All corrosion products appeared to be surface corrosion. No evidence of pitting or wall thinning was found.

   Additionally, when the receiver inlet isolation valves were removed, the adjacent check valves were found to be corroded. Corrective work orders were generated to replace these check valves. Regular preventive maintenance work orders were also created for the check valves to ensure their proper operation in the future.

   Several condition reports had previously documented rust in the Service Air system piping and seat leakage on valves due to rust in the system. Rust is expected in this system because the air is not dried and the piping is carbon steel. However, there was no piping integrity issue and therefore, complete piping replacement was not warranted at that time. The valves with seat leakage were gate valves used to isolate the air receivers and to split the Service Air headers. The present condition of the valves had not prevented required work from being completed. Receiver inspections could still be completed using these valves as isolation. Additionally, seat leakage on these valves was determined to have no adverse effect on the system since they are normally full open. It was concluded that if the seat leakage on these valves worsened then they could be replaced with stainless steel ball valves in the future.

3. In October of 2002, during an inspection of the internal surface of the Steam Generator Blowdown system acid tank corrosion and pitting of the tank wall base metal was noted. Tank thickness measurements were performed by ultrasonic examination and by using a pit gage. As found readings were compared to tank minimum wall thickness, which determined that base metal repair of the tank wall was not necessary. The inside surface of the

tank was coated with corrosion resistant material eliminating any further degradation in the tank.

4. During Refueling Outage 12 (Spring of 2008), internal inspections of the Train “B” Service Water strainer bypass line was performed, which identified several areas of rust staining and rust build-up. Ultrasonic thickness measurements were taken of the identified areas of concern. Subsequently, an engineering evaluation was performed, which concluded that the piping was acceptable for continued operation. The piping is currently scheduled to be repaired and/or replaced during Refueling Outage 14 (Spring of 2011).

The operating experience review revealed the aging effects falling under the Seabrook Station One-Time Inspection Program are not contributing to any adverse trend in performance or loss of component intended functions. The previous examples of operating experience provide objective evidence that the Seabrook Station One-Time Inspection Program will be effective in assuring that intended function(s) will be maintained consistent with the current licensing bases for the period of extended operation.

Conclusion

The Seabrook Station One-Time Inspection Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.21 SELECTIVE LEACHING OF MATERIALS

Program Description

The Seabrook Station Selective Leaching of Materials Program is a new program that manages the aging effect of loss of material due to selective leaching in components made of gray cast iron and copper alloys with greater than 15 percent zinc that are exposed to raw water, brackish water, treated water (including closed cycle cooling), or groundwater environment. Seabrook Station has also identified copper alloys with greater than 8 percent aluminum (e.g., aluminum bronze) as susceptible to selective leaching. Because NUREG-1801 does not include this material type, Seabrook Station has included it with the copper alloys with greater than 15 percent zinc components.

The Seabrook Station Selective Leaching of Materials Program will include a one-time inspection of selected components that may be susceptible to selective leaching. Because selective leaching is a slow acting corrosion process, the one-time inspection for selective leaching will be performed within the last five years prior to entering the period of extended operation.

Where practical, the inspection will include a representative sample of the population and focus on the bounding of lead components most susceptible to aging due to time in service, severity of operating conditions, and lowest design margin. Twenty percent of the population with a maximum sample of 25 constitutes a representative sample size. Otherwise, a technical justification of the methodology and sample size used for selecting components for a one-time inspection will be included in the Seabrook Station Selective Leaching of Materials Program. Each group of components with different material/environment combinations will be considered a separate population.

Visual inspection and mechanical examination techniques (Brinell hardness testing or other mechanical examination techniques such as destructive testing, when appropriate, scraping, chipping or other types of hardness testing), or additional examination methods that become available to the nuclear industry, will be used to determine if selective leaching is occurring on the surfaces of a selected set of components. NUREG-1801 XI.M33, "*Selective Leaching of Materials*," recommends that visual inspections be performed with Brinell hardness testing.

Visual inspection is capable of detecting corrosion while the mechanical test techniques such as chipping, scraping or hardness testing are capable of detecting a corroded or weakened component structure.

If it is determined that selective leaching is occurring, then an engineering evaluation will be initiated to determine acceptability of the affected components for continued service. Follow-up of unacceptable inspection findings will include an expansion of the inspection sample size and location.

NUREG-1801 Consistency

This program, with the exception noted below, is consistent with NUREG-1801 XI.M33.

Exceptions to NUREG-1801

1. NUREG-1801 XI.M33 states "*One acceptable procedure is to visually inspect the susceptible components closely and conduct Brinell Hardness testing on the inside surfaces of the selected set of components to determine if selective leaching has occurred.*"

   Seabrook Station will utilize visual inspections and mechanical examination techniques [(Brinell hardness testing or other mechanical examination techniques such as destructive testing (where appropriate), scraping, chipping or other types of hardness testing)], or additional examination methods that become available to the nuclear industry, to determine if selective leaching is occurring on the surfaces of a selected set of components.

Justification for the Exception

The form and configuration of many components do not physically allow access for Brinell hardness testing. This is particularly an issue with testing from the inside surface. In such cases, additional mechanical test techniques are needed.

The visual inspection is capable of detecting corrosion while the mechanical test techniques such as chipping, scraping or hardness testing are capable of detecting a corroded or weakened component structure.

Program Elements Affected: Element 4 (Detection of Aging Effects).

Enhancements

None

Operating Experience

Seabrook Station has experienced instances of de-aluminization of aluminum-bronze components having an internal environment of raw sea water. Seabrook Station has already recognized this aging mechanism and is pro-active in addressing the condition as it is discovered.

1. A 1998 condition report noted that throughout the sea water piping systems at Seabrook Station there are aluminum bronze pipe fittings which show signs of leakage. The condition report notes that some aluminum-bronze fittings have been replaced with copper-nickel fittings as permitted by an existing engineering change document. The condition report also identified related programmatic issues associated with aluminum-bronze pipe fittings.

   Actions taken as a result of this condition report include:

   a. Piping specifications for pipe classes applicable to small (less than 4 inch) non-ferrous piping and fittings in seawater service, non-safety related and safety-related, were revised to specify the use of copper nickel fittings, flanges and unions for the piping systems within these two pipe classes instead of the previously specified aluminum bronze.

b. The procurement department identified all stock codes for aluminum-bronze fittings, flanges and unions specified by the piping specifications noted above and disposed of in stock items, cancelled outstanding purchase orders and set affected stock codes to the appropriate status code.

c. Planning reviewed all outstanding Service Water work requests that specified the use of aluminum-bronze and changed the stock codes to reflect the new material fittings.

d. Piping designers were directed to specify copper nickel in lieu of aluminum-bronze for the affected piping systems. Engineering also reviewed and revised outstanding piping design change documents which specified the use of aluminum-bronze, fittings, flanges and unions.

2. A December 2002 condition report documented weepage through the valve body of Service Water system valve, 1-SW-V-48. The valve was a 3 inch aluminum-bronze plug valve. The condition report noted that sand cast aluminum-bronze valves are subject to de-aluminization, and that this is a known mechanism. The de-aluminized area was localized on the valve body downstream of the plug seating assembly. An engineering evaluation determined that, although weeping, the valve maintained its structural integrity. The valve was replaced during the subsequent Refueling Outage OR9 (Fall of 2003).

3. A 2007 condition report noted that three aluminum-bronze valves were scheduled for replacement and several others identified as no longer available from the original vendor. Seabrook Station Procurement identified a replacement bar stock ball valve that would eliminate the de-aluminization issue with the previous cast aluminum-bronze valves in sea water service.

These examples demonstrate that Seabrook has identified and addressed one form of selective leaching and has taken corrective actions to monitor and refurbish susceptible materials. Appropriate guidance for evaluation, repair, or replacement is provided for locations where de-aluminization was found. The previous examples of operating experience also provide objective evidence that the Seabrook Station Selective Leaching of Materials program will be effective in identifying other forms of selective leaching and ensuring that the intended function of components susceptible to such aging effects will be maintained.

Conclusion

The Seabrook Station Selective Leaching of Materials Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.22 BURIED PIPING AND TANKS INSPECTION

Program Description

The Seabrook Station Buried Piping and Tanks Inspection Program is a new program that will manage the aging effects of loss of material due to general pitting, crevice, and microbiologically influenced corrosion from the external surfaces of buried steel (including cast iron) and stainless steel components. Although the program refers to buried tanks as well as piping, Seabrook Station has no buried tanks in scope for license renewal. The systems that contain buried piping that credit this program are the Auxiliary Boiler, Control Building Air Handling, Condensate, Plant Floor Drain, Diesel Generator, Fire Protection and Service Water systems.

The Seabrook Station program will include preventive measures to mitigate corrosion and periodic inspections that manage the aging effects of corrosion on the pressure-retaining capacity of buried piping and bolting in the scope for license renewal.

The initial installation of in-scope buried steel and stainless steel piping at Seabrook Station included external coatings and wrappings. The Seabrook Station program will include provisions for visual inspections of the protective wraps and coatings on buried steel and stainless steel piping in the scope for license renewal. The visual inspections for damage will be performed when the pipes are excavated during maintenance or other activities and when a pipe is dug up and inspected. The inspections will look for evidence of damaged wrapping or coating defects, such as coating perforation, holidays, or other damage. If damage to the protective wraps or coatings is found, and the piping surface is exposed, the outer surface of the pipe will be inspected for loss of material.

Inspections intended to identify aging effects of corrosion on the pipe may also be performed by methods other than visual where such technology permits. An example of this type of emerging technology is ultrasonic inspection of pipe wall from the internal surface of the pipe designed to detect loss of material at the pipe external surface.

At least one opportunistic or focused inspection will be performed within the 10 year period prior to entering the period of extended operation. Upon entering the period of extended operation a planned inspection will be performed within ten years, unless an opportunistic inspection has occurred within that ten year period.

Opportunistic and/or focused visual inspections will be performed in areas with the highest likelihood of corrosion problems or areas with a history of corrosion problems.

The results of previous inspections will be evaluated, and used to assess the condition of the external surfaces of other buried steel and stainless steel components, and to identify susceptible locations that may warrant further inspections.

Any coating and wrapping degradations will be documented, repaired and evaluated under the Corrective Action Program.

NUREG-1801 Consistency

This program, with the exceptions noted below, is consistent with NUREG-1801 XI.M034.

Exceptions to NUREG-1801

1. NUREG-1801, XI.M34 states "*The program relies on preventive measures such as coating, wrapping and periodic inspection for loss of material caused by corrosion of the external surface of buried steel piping and tanks*".

   Seabrook Station includes stainless steel piping in the Buried Piping and Tanks Inspection Program.

   <u>Justification for the Exception</u>

   The program will inspect buried stainless steel piping when it is excavated. The inspection methods used for buried cast iron and carbon steel are applicable to buried stainless steel piping as well. Buried stainless steel piping is more resistant to pitting and crevice corrosion than carbon steels and other materials addressed in NUREG-1801 XI.M34 when exposed to soil and inspection of the buried stainless steel piping will detect unacceptable loss of material. Buried stainless steel pipes will be inspected for loss of material due to pitting and crevice corrosion and microbiologically influenced corrosion (MIC).

   Program Elements Affected: Element 1 (Scope of Program) and Element 3 (Parameters Monitored/Inspected).

Enhancements

None

Operating Experience

The Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues and events. Those issues and events, whether external or plant specific, that are potentially significant to the Buried Piping and Tanks Program Inspection Program are evaluated. The Buried Piping and Tanks Program Inspection Program is augmented, as appropriate, if these evaluations show that program changes will enhance program effectiveness.

1. Extensive visual inspection of buried Service Water system piping interior surfaces has been conducted since Refueling Outage 4 (Fall of 1995) with no indications of pipe wall degradation. The piping is cement lined, but degradation from the exterior surface is expected to lead to staining of the cement liner as water and corrosion products reach the inner surface of the pipe wall. When staining of the cement liner is found, the liner material is removed in order to evaluate the surface condition of the underlying pipe. Ultrasonic thickness measurements are taken to determine any degradation of the pipe wall. Such information, combined with no indication of interior pipe surface degradation, would indicate wall thinning cause by external environmental conditions. To date, there has been no indication of through wall leakage in the buried Service Water piping either originating from the inside surface or the outside surface. This example demonstrates one alternate indirect inspection method used to identify exterior surface degradation.

2. In November 2000, the Auxiliary Boiler buried fuel supply line was determined to be leaking diesel fuel into the surrounding soil. A small leak was discovered in the buried carbon steel pipe in an area where the bituminous wrap had been damaged. The fuel-contaminated soil was removed and with the concurrence of the New Hampshire Department of Environmental Services, the leak was temporarily repaired. In June 2001, after an examination of the failed section of pipe and visual/ultrasonic inspections at several excavations along the piping run further pipe deterioration was discovered and it was ultimately decided that the existing pipe would not be returned to service. A design change was initiated to replace the piping with dual-wall pipe meeting newly passed state requirements. A temporary modification was created to provide fuel oil during the period of implementation of this design change.

3. In March of 2001, a service vendor noticed oil drops coming from the ground around the fuel oil pumps at the vehicle maintenance shop. After excavation, the source of the leak was found to be at a threaded

joint. An evaluation of the condition determined that the most likely cause of the pipeline leakage was the loosening of the joints over time due to temperature changes and frost heaving. The pumping station and underground piping were removed and a new pumping station and dual-wall underground piping with leak detection capability installed. This piping is not in the scope of license renewal, but the example demonstrates appropriate investigation of and response to identified degradation of buried piping.

4. A branch connection was installed in a 6 inch buried Fire Protection system line in 2007. When excavated, the existing carbon steel pipe was inspected and showed no degradation of the coating or external surfaces.

5. Following excavation to repair a Fire Protection valve in September 2008, minor damage to the external tape coat on a 12" carbon steel Fire Protection line was found. Engineering was notified and the condition documented in the Seabrook Station Corrective Action Program. An inspection report was issued, which included documentation that the coating was worn but no metal (pipe) was exposed, and that there were no signs of backfill embedded in the coating. The coating was repaired and the area backfilled. This example demonstrates the appropriate notifications and inspections utilized when opportunistic observations detect evidence of conditions that could affect the integrity of buried piping.

6. Following an EPRI workshop on buried piping, the Seabrook Station attendees initiated the development of a buried piping program. A plan was developed and appropriate actions assigned in the Seabrook Station Corrective Action Program to implement this program. Specific actions were assigned in under the Corrective Action Program in November 2007. Underground piping was identified and inventoried by the respective system engineers, and a Buried Piping System Health Report generated. This health report is issued periodically by the assigned System Engineer. Seabrook Station procedures are being developed and will form the bases for this program.

These examples of Seabrook Station operating experience provide evidence that the Buried Piping and Tanks Inspection Program will adequately monitor the aging effects and that Seabrook Station is maintaining an awareness and sensitivity to operating experiences throughout the industry that could impact this program.

Conclusion

The Seabrook Station Aging Management Program for Buried Piping and Tanks Inspection provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.23 ONE-TIME INSPECTION OF ASME CODE CLASS 1 SMALL BORE PIPING

Program Description

The Seabrook Station One-Time Inspection of ASME Code Class 1 Small Bore Piping Program is a new program that will manage the aging effect of cracking in stainless steel small-bore ASME Code Class 1 piping less than 4 inches nominal pipe size, including pipe, fittings, and branch connections. While the ASME Boiler and Pressure Vessel Code, Section XI, *"Rules for Inservice Inspection of Nuclear Power Plant Components",* does not require volumetric examination of Class 1 small-bore piping, the Seabrook Station One-Time Inspection of ASME Code Class 1 Small Bore Piping Program will be used to identify cracking due to stress corrosion cracking and thermal and mechanical loading by performing volumetric examinations of selected piping.

Seabrook Station has not experienced cracking of ASME Code Class 1 small-bore piping resulting from stress corrosion or thermal and mechanical loading.

NUREG-1801 Section XI.M35, *"One-Time Inspection of ASME Code Class 1 Small-Bore Piping",* includes piping *"less than or equal to NPS 4 inch"* with a reference to ASME Section XI, Table IWB-2500-1, Examination Category BJ, item number B9-21; however, according to the ASME Code, a volumetric examination already is required for piping equal to 4 inches nominal pipe size. Consistent with the Code, NUREG-1801 Item IV.C2-1 applies the One-Time Inspection of ASME Code Class 1 Small Bore Piping Program (XI.M35) only to Class 1 piping less than 4 inches nominal pipe size. On this basis, Seabrook Station concludes that the intent of the NUREG-1801 program is not to include 4 inch pipe.

The Seabrook Station ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD Program, B.2.1.1, currently includes volumetric examination of welds on Class 1 pipe 4 inches nominal pipe size and larger. The Seabrook Station One-Time Inspection of ASME Code Class 1 Small Bore Piping Program will select a sample from the total population of ASME Code Class 1 small bore (less than 4 inches nominal pipe size) piping locations based on susceptibility, inspectability, dose considerations, operating experience, and limiting locations using the recommendations of

MRP-146, *“Material Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines”,* or later updated guidance. The inspection sample determination will include both socket welds and butt welds. If non-destructive volumetric inspection techniques have not been qualified, Seabrook will have the option to remove the weld for destructive examination.

When a one-time inspection reveals evidence of cracking due to stress corrosion cracking or thermal and mechanical loading, evaluation of the inspection results will develop appropriate corrective actions which may include periodic inspections. Flaws or indications exceeding the acceptance criteria of ASME Section XI Paragraph IWB-3400 will be evaluated in accordance with ASME Section XI Paragraph IWB-3131, and any additional examinations will be performed in accordance with ASME Section XI Paragraph IWB-2430.

A count of Class 1 welds less than 4 inches nominal pipe size noted approximately 400 welds in the Reactor Coolant (RC), Chemical and Volume Control (CS) and Safety Injection (SI) systems. Approximately 25% of these are socket welds. The number of welds on pipe less than 2 inches nominal pipe size (which includes small branch connections) is less than 50% of the total population.

This program will be an inspection activity independent of methods to mitigate or prevent degradation. No preventative actions will be required.

The Seabrook Station One-Time Inspection of ASME Code Class 1 Small Bore Piping Program will inspect for cracking in ASME Code Class 1 small-bore piping using volumetric examination techniques available. Should, evaluation of the inspection results indicate the need for additional examinations, such examinations will be consistent with ASME Section XI, Subsection IWB.

If flaws or indications exceed the acceptance criteria of ASME Code, Section XI, Paragraph IWB-3400, they will be evaluated in accordance with ASME Code, Section XI, Paragraph IWB-3131, and additional examinations will be performed in accordance with ASME Code, Section XI, Paragraph IWB-2430.

Repairs and replacements will be performed in accordance with applicable Section XI rules and requirements.

NUREG-1801 Consistency

This program, with the exception noted below, is consistent with NUREG-1801 Section XI.M35.

Exceptions to NUREG-1801

1. NUREG 1801 XI.M35 states "*Guidelines for identifying piping susceptible to potential effects of thermal stratification or turbulent penetration are provided in EPRI report 1000701, 'Interim Thermal Fatigue Management Guideline (MRP-24)', January 2001.*"

   When identifying piping susceptible to potential effects of thermal stratification or turbulent penetration, Seabrook Station will follow the guidance issued as EPRI Report 1011955, *"Materials Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines (MRP-146)"* issued in June of 2005 and the supplemental guidance issued in EPRI Report 1018330, *"Materials Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines - Supplemental Guidance (MRP-146S)"* issued in December of 2008.

   <u>Justification for the Exception</u>

   EPRI *MRP-24* was an interim report. This interim report was meant to provide early feedback to PWR plant operators prior to completion of the MRP project and provide a common industry approach that may be used to assess the potential for thermal fatigue cracking in piping systems where through-wall leakage has been observed in other plants in the past.

   EPRI *MRP-146* was issued in June of 2005 to expand on an interim guideline and to provide an ongoing fatigue management program in affected lines.

   EPRI *MRP-146S* issued in December of 2008 provides supplemental guidance for assessment of normally stagnant non-isolable reactor coolant system branch lines as required by MRP-146, including an implementation schedule for requirements. Seabrook Station will review and incorporate information as it is made available by EPRI.

   Program Elements Affected: Element 1 (Scope of Program).

Enhancements

None

Operating Experience

The Seabrook Station One-Time Inspection of ASME Code Class 1 Small Bore Piping Program is a new program. Both plant and industry operating experience will be used to establish the program and to ensure that this inspection uses volumetric inspection techniques with demonstrated capability and a proven industry record to detect cracking in piping weld and base material. The specific examination techniques utilized will be qualified prior to performing the examinations.

The Seabrook Station Second Ten-Year Period Inservice Inspections included volumetric examination of twenty-seven 2 inch and 3 inch Class 1 butt welds. No indication of cracking was noted in any of those locations. A search of the Seabrook Station condition reports also showed no reported degradation or failures in Class 1 piping less than 4 inches nominal pipe size.

Conclusion

The Seabrook Station One-Time Inspection of ASME Code Class 1 Small Bore Piping Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.24 EXTERNAL SURFACES MONITORING

Program Description

The Seabrook Station External Surfaces Monitoring Program is an existing program that manages the aging effects of (a) hardening and loss of strength due to elastomer degradation, (b) reduction of heat transfer due to fouling, (c) loss of material due to general, pitting, crevice, galvanic, and microbiologically influenced corrosion and due to fouling, and (d) loss of material due to wear; through visual inspection and non-visual tactile inspections of external surfaces. This program consists of periodic inspections of aluminum, cast austenitic stainless steel, copper alloy, copper alloy >15% zinc (Zn), elastomer, galvanized steel, gray cast iron, nickel alloy, stainless steel and steel components. The aging effect of loss of material due to boric acid corrosion is managed by the Boric Acid Corrosion Program, B.2.1.4. The aging effect of loss of material for buried piping and components is managed by the Buried Piping and Tanks Program, B.2.1.22. The aging effect of loss of material for supports and structural components is managed by the Structures Monitoring Program, B.2.1.31.

The Seabrook Station External Surfaces Monitoring Program utilizes periodic system inspections and walk downs to monitor for materials degradation and leakage. This program inspects components such as piping, piping components, ducting and other components, including bolting, within the scope of license renewal. Coatings deterioration is monitored as an indication of possible underlying degradation.

The Seabrook Station External Surfaces Monitoring Program conducts visual inspection of component surfaces at least once per refueling cycle. This frequency accommodates inspections of components that may be in locations that are normally only accessible during outages. The intervals of inspections may be adjusted as necessary based on plant-specific inspection results and industry experience.

For surfaces that are insulated, inspections of opportunity will be performed to assess the external condition when insulation is removed for maintenance or inspection and the external surface is exposed. The insulated piping and components of interest are those within the scope of this program with low normal operating temperatures and in indoor or outdoor environment such that the piping could be wetted under its insulation.

The Seabrook Station External Surfaces Monitoring Program will require a periodic review of documented under-insulation inspection results to verify that there were a sufficient number of inspection opportunities to provide a representative indication of system condition, and to assess the need for further inspections.

Seabrook Station does not credit the External Surfaces Monitoring Program for age managing loss of material on internal surfaces.

The Seabrook Station External Surfaces Monitoring Program is a visual monitoring and inspection program that does not include preventive actions.

Examples of inspection parameters include:

a. corrosion and material wastage (loss of material),
b. leakage from or onto external surfaces,
c. worn, flaking, or oxide-coated surfaces,
d. corrosion stains on thermal insulation,
e. insulation damage or wetting,
f. protective coating degradation (blistering, cracking and flaking),
g. cracking or flaking of non-metallic components
h. accumulation of dirt or debris contributing to loss of heat transfer
i. surface breaking flaw (i.e., cracks or surface areas that have exhibited loss of material)
j. discontinuities and imperfections

Degradation of coated metallic surfaces cannot occur without the degradation of the paint or coating. Confirmation of the integrity of the paint or coating is an effective method for managing the effects of corrosion on the steel surface. No credit is taken for coatings to protect equipment from corrosion, but loss of integrity of coating can indicate evidence of corrosion.

Metallic components including aluminum, cast austenitic stainless steel, copper alloy, copper alloy >15% Zn, galvanized steel, gray cast iron, nickel alloy and stainless steel would exhibit indications of loss of material on the surface similar to steel material and visual inspections will be capable of detecting any surface breaking flaws (i.e., cracks or surface areas that have exhibited loss of material).

The program inspects for hardening and loss of strength in components made from elastomers by visual examinations to detect discontinuities and imperfections of the surface of the component, and non-visual examinations such as tactile techniques, which include scratching, bending, folding, stretching and pressing in conjunction with the visual examinations. Scratching the material will screen for residues that may indicate a breakdown of the elastomer material, bending or folding of the component may indicate surface cracking, stretching to evaluate resistance of the elastomer material and pressing on the material to evaluate the resiliency.

The program inspects for loss of material due to wear for elastomers only. The same visual examination and tactile techniques used to detect hardening and loss of strength in elastomers are used to detect wear in the components made from elastomers.

The program inspects for loss of material due to general, crevice and pitting corrosion using visual inspection.

The program inspects for loss of material due to galvanic corrosion. This aging mechanism will be detectible as the galvanic corrosion mechanism will create a corrosion product detectable by visual inspection similar to general corrosion.

The program inspects for reduction of heat transfer due to fouling. The program is only credited for management of heat transfer degradation due to fouling of the external surface of cooling coils that are exposed to an external air environment. Visual examinations performed as part of this program are capable of identifying corrosion, discoloration and accumulation of dirt/debris which are indicative of heat transfer degradation due to fouling.

Visual inspection activities are performed and associated personnel are qualified in accordance with site controlled procedures and processes. Personnel having the responsibility to perform these system specific walkdowns will be trained and qualified to perform these inspections.

Seabrook Station has existing guidance documents that support a monitoring and trending process to track degradation. The "*Systems Walkdowns*" guideline sets the parameters and expectations for conducting system engineer walkdown. The "*Performance Monitoring Guidelines*" provides the expectations for trending, analyzing and benchmarking system performance down to the component level. The "*System Health Reports*" guideline describes how the review of the system performance is documented.

Acceptance criteria will be applied to the results of corrective action evaluations and will include design standards, procedural requirements, current licensing basis, industry codes or standards, and engineering evaluation. The results of the evaluation will determine a threshold for action.

NUREG-1801 Consistency

This program, with the exceptions noted below, is consistent with NUREG-1801 XI.M36.

Exceptions to NUREG-1801

1. NUREG 1801 XI.M36 states *"This program visually inspects the external surface of in-scope components and monitors external surfaces of steel components in systems within the scope of license renewal and subject to AMR for loss of material and leakage."*

   Seabrook Station includes components made from additional materials such as aluminum, cast austenitic stainless steel (CASS), copper alloy, copper alloy >15% Zn, elastomer, galvanized steel, gray cast iron, nickel alloy, and stainless steel and have included them in the scope of this program.

   Justification for the Exception

   Seabrook Station has identified components made from materials other than steel that have surfaces exposed to an external environment. These components may also be subject to potential aging effects that should be managed under a license renewal aging management program.

   Program Elements Affected: Element 1 (Scope of Program).

2. NUREG-1801 XI.M36 states: "*This program is credited with managing the following aging effects.*

   a. *Loss of material for external surfaces;*

   b. *Loss of material for internal surfaces exposed to the same environment as the external surface*"

   NUREG-1801 XI.M36 also states *"Therefore, this program is acceptable for use in inspecting for loss of material for general, pitting and crevice corrosion."*

Seabrook Station includes the additional aging effects of hardening and loss of strength, reduction of heat transfer, and loss of material due to galvanic corrosion and wear.

Justification for the Exception

The NUREG-1801 program limits its discussion of those aging effects (general, pitting and crevice corrosion) that are likely to occur on the external surface of steel components, which is the singular material addressed by the program. Since Seabrook Station also includes components made from aluminum, cast austenitic stainless steel, copper alloy, copper alloy >15% Zn, elastomer, galvanized steel, gray cast iron, nickel alloy, and stainless steel, the additional aging effects of hardening and loss of strength, reduction of heat transfer, and loss of material due to galvanic corrosion and wear need to be addressed.

Aluminum, cast austenitic stainless steel, copper alloy, copper alloy >15% Zn, galvanized steel, gray cast iron, nickel alloy and stainless steel components would exhibit indications of loss of material on the surface similar to steel material and visual inspections will be capable of detecting any surface breaking flaws (i.e., cracks or surface areas that have exhibited loss of material) that occur on the same side as that being examined.

The program inspects for hardening and loss of strength in components made from elastomers by visual examinations to detect discontinuities and imperfections of the surface of the component, and non-visual examinations such as tactile techniques, which include scratching, bending, folding, stretching and pressing in conjunction with the visual examinations. Scratching the material will screen for residues that may indicate a breakdown of the polymer material, bending or folding of the component may indicate surface cracking, stretching to evaluate resistance of the elastomer material and pressing on the material to evaluate the resiliency.

The program also inspects for loss of material due to wear for elastomers only. The same visual examination and tactile techniques used to detect hardening and loss of strength in elastomers are used to detect wear in the components made from elastomers.

Program Elements Affected: Element 1 (Scope of Program) and Element 4 (Detection of Aging Effects).

Enhancements

The following enhancement will be made prior to entering the period of extended operation.

1. Seabrook Station procedures will be enhanced to more specifically address the scope of the program, relevant degradation mechanisms and effects of interest, the refueling outage inspection frequency, the inspections of opportunity for possible corrosion under insulation, the training requirements for inspectors and the required periodic reviews to determine program effectiveness.

   Program Elements Affected: Element 1 (Scope of Program), Element 3 (Parameters Monitored/Inspected), Element 5 (Monitoring and Trending), and Element 6 (Acceptance Criteria)

Operating Experience

The existing walkdowns at Seabrook Station have been effective in identifying leakage or corrosion in systems. The following operating experience demonstrates program effectiveness:

1. In July 2002, during a system walkdown, the system engineer noted that the Primary Component Cooling Water heat exchanger outlet lines were subject to external corrosion due to condensation. Further review of the condition by the System Engineer revealed that the type of insulation installed on the subject piping was incorrect and not in accordance with the piping specification. The system engineer identified that the subject piping should have the Armoflex anti sweat insulation instead of the fiberglass thermal insulation. The system engineer also identified that in its current condition, the condensation was being absorbed by the fiberglass insulation, creating a corrosion cell on the carbon steel piping substrate. As a result, the existing fiberglass insulation was removed and replaced with anti sweat type insulation. Additionally, upon removal of the fiberglass insulation, the carbon steel piping external surfaces were inspected to ensure that no unacceptable surface corrosion had taken place.

2. In July 2004, a condition report was initiated describing Service Water lines in the intake transition structure exhibiting a heavy coating of corrosion product over the entire length of piping. Ultrasonic thickness measurements were taken on the pipe, which showed no notable wall loss from external corrosion. This issue was presented to the plant health committee which approved funding for painting the pipe. Subsequently, the piping was painted in 2008 to preclude further corrosion.

3. In August 2004, a condition report was initiated to report external surface corrosion on Diesel Generator piping. Ultrasonic thickness measurements were taken and indicated pipe wall thickness below the original installation value. An engineering evaluation was performed to assess the degraded condition. The results of the engineering evaluation determined that the applicable design code requirements for all design conditions were satisfied, and therefore, the measured reduced wall thickness was determined to be acceptable.

   The condition report evaluation determined the cause of corrosion was due to condensation dripping from the Service Water system piping located directly above the Diesel Generator piping. As part of the corrective actions, the corroded piping was cleaned and recoated under a work order. To prevent recurrence, a sheet metal diverter was installed above the Diesel Generator piping per an engineering change to prevent condensation from dripping onto the Diesel Generator piping.

4. In August 2008, “B” Emergency Feedwater pump FW-P-37B seal water flange fastener nuts were reported to exhibit evidence of corrosion. Subsequently, the condition was evaluated by engineering and the cause of the corrosion was determined to be leakage from the pump vent, which was used when refilling the pump following maintenance. A work order was generated to correct the leakage from the vent cap on the pump. As part of the extent of condition review, the “A” Emergency Feedwater pump was also inspected and a similar leakage from the vent cap for this pump was noted. A second work order was initiated to correct the leakage from the vent cap on the “A” Emergency Feedwater pump.

The above examples provide objective evidence that when surface corrosion is identified, it is entered into the corrective action process so that corrective actions will be taken to address the issues. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The previous examples of operating experience provide objective evidence that the Seabrook Station External Surfaces Monitoring Program will be effective in ensuring that intended function(s) will be maintained.

Conclusion

The Seabrook Station External Surfaces Monitoring Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.25 INSPECTION OF INTERNAL SURFACES IN MISCELLANEOUS PIPING AND DUCTING COMPONENTS

Program Description

The Seabrook Station Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is a new program that will manage the aging effects of (a) cracking due to stress corrosion cracking, (b) loss of material due to general, pitting, crevice, galvanic and microbiologically influenced corrosion and due to fouling (c) loss of material due to erosion and wear (d) reduction of heat transfer due to fouling, and (e) hardening and loss of strength due to elastomer degradation. This program will consist of inspections of the internal surfaces of aluminum, cast austenitic stainless steel, copper alloy, copper alloy >15% Zn, elastomer, galvanized steel, gray cast iron, nickel alloy, stainless steel, and steel piping, piping components, ducting and other components that are not covered by other aging management programs.

The program inspections will be inspections of opportunity, performed during pre-planned periodic system and component surveillances or during maintenance activities when the systems are opened and the surfaces made accessible for visual inspection. This maintenance may occur during power operations or refueling outages when many systems are opened. The visual inspections will assure that existing environmental conditions are not causing material degradation that could result in a loss of the component intended function. The program will include indication of borated water leakage on internal surfaces. The Seabrook Station program will provide for visual inspection activities performed by personnel who are qualified in accordance with site controlled procedures and processes.

On implementation of this program, the maintenance planning process will include the opportunity for an internal inspection for work orders planned for the system or components identified as requiring aging management under the Seabrook Station Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. The program will then be implemented to the maximum extent practical.

All inspection results will be sent to the associated system engineer. The results of these inspections of opportunity will be evaluated and tracked as part of the system health assessment program and integrated with the plant corrective action process. Condition reports associated with a particular system will be subject to the system engineer’s review on a periodic basis.

Periodic inspections will provide for detection of aging effects prior to the loss of component function. The inspections of internal surfaces will detect the aging effects of cracking, hardening and loss of strength, loss of material, and reduction of heat transfer. For painted or coated surfaces, degradation of steel surfaces cannot occur without the degradation of the paint or coating. Confirmation of the integrity of the paint or coating is an effective method for managing the effects of corrosion on the steel surface. Paint or coating degradation will be identified by the presence of blistering, cracking, rusting, loss of adhesion, and mechanical damage. For uncoated surfaces, visual inspections will directly monitor for surface degradation including indications of general corrosion.

The program will be an inspection and condition monitoring program; therefore no preventive actions or steps exist to mitigate or prevent component degradation.

Visual inspections of internal surfaces of plant components will be performed during maintenance or surveillance activities. The presence of corrosion or fouling will be identified by visual inspection as localized discoloration and surface irregularities such as rust, scale/deposits, surface pitting, surface discontinuities and coating degradation. Metallic components including aluminum, brass or bronze, cast austenitic stainless steel, copper alloy, copper nickel and stainless steel will exhibit indications of loss of material on the surface similar to steel material and visual inspections will be capable of detecting any surface breaking flaws (i.e., cracks or surface areas that have exhibited loss of material) that occur on the same side as that being examined.

The program will be used to detect cracking due to stress corrosion cracking in a limited number of stainless steel components exposed to steam or diesel exhaust. The Auxiliary Heating Steam System has some stainless steel components in steam while the Diesel Generator and Fire Protection systems have some stainless steel components with an internal environment of diesel exhaust. The inspection techniques utilized to detect this aging effect will be either visual inspection with a magnified resolution as described in 10 CFR 50.55a (b)(2)(xxi)(A) or an ultrasonic inspection method. The inspections will be performed by qualified personnel using proven techniques in accordance with Seabrook Station procedures and processes.

The program will be used to detect hardening and loss of strength in components made from elastomers by visual examinations and non-visual examinations such as tactile techniques, which include scratching, bending, folding, stretching and pressing in conjunction with the visual examinations. Scratching the material will screen for residues that may indicate a breakdown of the elastomer material, bending or folding of the component may indicate surface cracking, stretching to evaluate resistance of the elastomer material and pressing on the material to evaluate the resiliency.

The inspection results will be reviewed as part of the system health reports. The reviews will include tracking and trending over time to determine if an appropriate number of locations and inspection intervals will be able to provide reasonable assurance that the effects of aging will be adequately managed consistent with the current licensing basis for the period of extended operation.

The system engineer review of inspection results will help ensure that the extent and schedule of inspections and testing detect component degradation prior to loss of intended function.

Acceptance criteria for indications of various corrosion mechanisms or fouling will be identified in the appropriate inspection procedure and will be part of the training/qualification program required for inspectors. Visual inspection will monitor parameters such as corrosion, corrosion byproducts, coating degradation, discoloration on the surface, scale/deposits, pits and surface discontinuities. The degree to which these conditions exist will be used to establish baseline acceptance criteria for future inspections. For painted or coated surfaces, any evidence of damaged or degraded coating may be an indicator of corrosion damage to the surface underneath. Therefore, evidence of damaged or degraded coatings will be documented and evaluated using the Seabrook Station Corrective Action Program. For materials susceptible to corrosion heavy corrosion, localized corrosion, blistering, pitting, or visible loss of material due to corrosion will be documented and evaluated using the Seabrook Station Corrective Action Program. A thin, light, even layer of oxidation provides protection against further corrosion. Oxidation is expected in some systems, and is acceptable.

Other inspection results identified as having the potential to degrade the component or system intended function will also be documented and processed in accordance with the Seabrook Station Corrective Action Program.

NUREG-1801 Consistency

This program, with the exceptions noted below, is consistent with NUREG-1801 XI.M38.

Exceptions to NUREG-1801

1. NUREG 1801 XI.M38 states *"The program visual inspections include internal surfaces of steel piping, piping elements, ducting, and components in an internal environment (such as indoor uncontrolled air, condensation, and steam) that are not included in other aging management programs for loss of material. Inspections are performed when the internal surfaces are accessible during the performance of periodic surveillances, during maintenance activities or during scheduled outages".*

   The Seabrook Station program will also apply to components made from other materials such as aluminum, cast austenitic stainless steel, copper alloy, copper alloy >15% Zn, elastomer, galvanized steel, gray cast iron, nickel alloy, and stainless steel.

Justification for the Exception

Seabrook Station has identified components made from materials other than steel having surfaces exposed to internal environments which are not covered by other aging management programs. These components may also be subject to potential aging effects and should be managed under a license renewal aging management program. Seabrook Station has included these components in the Seabrook Station Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program.

Program Elements Affected: Element 1 (Scope of Program).

2. NUREG-1801 XI.M38 states "*Visual inspections of internal surfaces of plant components are performed during maintenance or surveillance activities. Parameters monitored or inspected include visible evidence of corrosion to indicate possible loss of materials".*

   The Seabrook Station program will include the additional aging effects cracking, reduction of heat transfer, and hardening and loss of strength.

   Justification for the Exception

   Since NUREG-1801 Section XI.M38 limits the scope of inspections to steel components with the aging effect of loss of material, aging effects for components made from other materials having other aging effects, are identified as exceptions to the program. NUREG-1801 Section XI.M38 requirements state that the applicant should identify and justify the inspection technique used for detecting the aging effects of concern. This discussion for the additional aging effects, other than loss of material, follows.

   The Seabrook Station program will allow for visual inspection to detect reduction of heat transfer due to fouling. The heat exchangers age managed under this program do not require precise determination of heat transfer capability, and a visual inspection of the heat exchanger internals will be able to determine whether or not the overall heat transfer function of the component is degraded.

   The program will be used to detect cracking due to stress corrosion cracking in a limited number of stainless steel components exposed to steam or diesel exhaust. The Auxiliary Steam Heating System has some stainless steel components in steam while the Diesel Generator Fire Protection systems have some stainless steel components with an internal environment of diesel exhaust. The inspection techniques utilized to detect this aging effect will be either visual inspection with a magnified resolution as described in 10 CFR 50.55a(b)(2)(xxi)(A) or an ultrasonic inspection method. Note that NUREG 1801 Section XI.M32 “One Time Inspection” recommends the use of an enhanced VT-1 visual inspection or ultrasonic inspection technique as an acceptable means to detect cracking due to stress corrosion cracking. The inspections will be performed by qualified personnel using proven techniques in accordance with Seabrook Station procedures and processes.

The program will be used to detect hardening and loss of strength in components made from elastomers by visual examinations and non-visual examinations such as tactile techniques, which include scratching, bending, folding, stretching and pressing in conjunction with the visual examinations. Scratching the material will screen for residues that may indicate a breakdown of the elastomer material, bending or folding of the component may indicate surface cracking, stretching to evaluate resistance of the elastomer material and pressing on the material to evaluate the resiliency.

Program Elements Affected: Element 3 (Parameters Monitored/Inspected).

Enhancements

None

Operating Experience

While the Seabrook Station Inspections of Internal Surfaces in Miscellaneous Piping and Ducting Components is a new program, Seabrook Station has been completing inspections of the internal surfaces of components during the performance of maintenance activities. During the normal course of maintenance, it is a natural part of the work process to identify the as-found conditions of the equipment or system that is the subject of the work activity. The FPL/NextEra Corporate Guidance for Maintenance sets expectations for documenting as-found conditions as part of the conduct of maintenance. This documentation includes non-conformances that needed to be resolved and any condition reports written.

The Seabrook Station Corrective Action Program has been successful in identifying potentially adverse conditions that were found when components or systems were opened for maintenance or surveillance. The corrective action process drives the evaluation and actions needed to resolve the identified condition. Below are examples of equipment internal surface degradation identified during maintenance and walk down activities.

1. In May of 2001, during an inspection of the Fire Protection fire water storage tank heat exchanger, 1-FP-E-46, evidence of corrosion was found inside the shell of the heat exchanger. The corrosion was evaluated and determined to be minor and no further action was required at that time.

   In August of 2001, during an inspection of the fire water storage tank heat exchanger, 1-FP-E-47, localized pitting was discovered inside the heat exchanger shell at the steam inlet similar to the condition previously observed in 1-FP-E-46. A weld repair was performed to repair the localized area of wall damage.

   In August 2005, during a repeat inspection of the fire water storage tank heat exchanger 1-FP-E-46 localized pitting was observed inside the shell of the heat exchanger. Plant engineering was notified and an ultrasonic examination was performed. Parts of the heat exchanger were below minimum wall thickness and a base metal repair was performed prior to returning the heat exchanger to service.

2. In February 2002, during a maintenance activity on Screen Wash System valve, 1-SCW-V-3, corrosion was found on the check valve internals. The valve was replaced. An extent of condition evaluation was performed, which identified two other valves (1-SCW-V-5 and 1-SCW-V-10) that could have the same condition as 1-SCW-V-3. As a result, preventive maintenance activities were developed for the disassembly and inspection of all three valves with a frequency of every six years. Subsequently, the disassembly and inspection of 1-SCW-V-5 was performed in April 2003. The disassembly and inspection of 1-SCW-V-10 was performed in November 2004. The second disassembly and inspection of 1-SCW-V-3 was performed in December 2008.

3. During Refueling Outage 12 (Spring of 2008), an area of concrete liner degradation was detected inside the Service Water cement lined carbon steel piping during internal inspections of AMEX-10/WEKO elastomer seals. The base metal was inspected and no evidence of metal loss was detected. The effected area of the liner was repaired with an epoxy coating material prior to being returned to service.

4. In January 2009, during Train “B” Diesel Generator outage, a black material similar to sand and small corrosion products were found in the jacket water cooling piping. A material sample was sent out for analysis, the review of the report showed similar material results to previous condition report findings for the system. There was nothing in the evaluation indicating that this was a new issue. The evaluation concluded that the particles are small enough that no blockage would be expected in any of the smaller passages of the engine. This issue is currently being trended by the System Engineer.

The above operating experience examples provides objective evidence that existing maintenance activities will identify internal degradation prior to loss of system components intended functions.

Conclusion

The Seabrook Station Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.26 LUBRICATING OIL ANALYSIS

Program Description

The Seabrook Station Lubricating Oil Analysis Program is an existing program that performs oil condition monitoring activities to manage the aging effects of loss of material due to galvanic, general, pitting, crevice, and microbiologically influenced corrosion, and fouling and heat transfer degradation due to fouling. Seabrook Station has no components within the scope of this program with an aging mechanism of cracking.

The purpose of the Seabrook Station Lubricating Oil Analysis Program is to obtain and analyze lubricating oil samples from plant equipment to ensure that the oil quality is maintained within established limits. The frequency of monitoring will vary depending on such factors as regulatory guidance, Technical Specification requirements of the equipment being worked on, vendor recommendations, continuous versus standby use, plant and industry experience with similar equipment, engineering analysis of equipment performance, the relative importance of the equipment to plant operation/ safety, and the maintenance history of the equipment.

The Seabrook Station Lubricating Oil Analysis Program includes sampling and analysis of lubricating oil for components within the scope of license renewal and subject to aging management review, that are exposed to lubricating oil and for which pressure boundary integrity or heat transfer is required for the component to perform its intended function. The One-Time Inspection Program (B.2.1.20) is used to verify the effectiveness of this program for managing the aging effects of piping and components in systems that contain lubricating oil.

The Seabrook Station Lubricating Oil Analysis Program provides an early indication of adverse equipment condition in lubricating oil environments. This program is administered and controlled by Seabrook Station maintenance program and procedures.

For components that undergo periodic oil changes in accordance with manufacturer's recommendations, a particle count and check for water are performed to detect evidence of abnormal wear rates, moisture contamination, or excessive corrosion. For components that do not have regular oil changes, the Seabrook Station Lubricating Oil Analysis Program determines percent water, viscosity, neutralization number and fuel dilution as applicable to verify the oil is suitable for continued use. In addition, analytical ferrography and elemental analysis are performed to identify wear particles.

Periodic oil sampling and compliance with the established acceptance criteria provide assurance that oil contaminants do not exceed acceptable levels. This practice preserves an environment that is not conducive to aging mechanisms that could lead to the aging effects of loss of material and heat transfer degradation.

Oil analysis results are reviewed to determine if alert levels or limits have been reached or exceeded. This review also checks for unusual trends. The Condition Based Maintenance Engineer determines routine test requirements for each equipment type, determines additional testing when need is indicated by test results, trend test results and in conjunction with other predictive maintenance program owners, makes recommendation to system engineering for maintenance or other corrective actions.

Sample analysis reports are reviewed to verify that contaminants (water and particulates) do not exceed limits based on manufacturer's recommendations or industry standards recommended for each component type.

Particle size and count or concentration is determined in accordance with industry standard ASTM D 6224, *"Standard Practice for In-Service Monitoring of Lubricating Oil for Auxiliary Power Plant Equipment"*. ASTM D 6224 particle count is based on ISO 4406, *"Hydraulic Fluid Power - Fluids - Method for Coding the Level of Contamination by Solid Particles"***.** Water and particle concentration is tested, not to exceed limits based on manufacturer's recommendation and industry standard recommendation for each component type.

Viscosity bands are based on a tolerance around the manufacturer's typical viscosity value, baseline value or point reference of the lubricating oil as recommended by the component manufacturer, analysis of equipment data or industry standards.

Metal limits as determined by spectroscopic analysis (spectral analysis or ferrography) are based on original baseline data and manufacturer's recommendations and industry standards.

NUREG-1801 Consistency

This program, with the exception noted below, is consistent with NUREG-1801 XI.M39.

Exceptions to NUREG-1801

1. NUREG-1801 XI.M39 states *"For components with periodic oil changes in accordance with manufacturer's recommendations, a particle count and check for water are performed to detect evidence of abnormal wear rates, contamination by moisture, or excessive corrosion. For components that do not have regular oil changes, viscosity, neutralization number, and flash point are also determined to verify the oil is suitable for continued use. In addition, analytical ferrography and elemental analysis are performed to identify wear particles"*.

   Seabrook Station does not sample for flash point in lubricating oil samples.

   <u>Justification for Exception</u>

   Testing for flash point of lubricating oil is only needed for lubricating oil that could become contaminated by fuel. Lubricating oil in many applications is not subject to this contamination (such as steam driven turbines or motor driven pumps) and testing for flash point is not needed. When there is no potential for contamination the lube oil will not be tested for flash point. In fact, ASTM D6224, *"Standard Practice for In-Service Monitoring of Lubricating Oil for Auxiliary Power Plant Equipment"*, states that flash point testing is optional for diesel engines.

   When there is a potential for contamination by fuel Seabrook Station will test the samples for fuel dilution. This is equivalent to testing for flash point as either test will provide an indication of fuel in-leakage. An example of the ability to detect fuel in-leakage using this method is included in operating experience.

   Program Elements Affected: Element 3 (Parameters Monitored/Inspected).

Enhancements

The following enhancements will be made prior to entering the period of extended operation.

1. The Seabrook Station Lubricating Oil Analysis Program will be enhanced to provide an attachment with required equipment, and include the lube oil analysis required, sampling frequency, and required periodic oil changes.

Program Elements Affected: Element 3 (Parameters Monitored/Inspected) and Element 4 (Detection of Aging Effects)

2. The Seabrook Station Lubricating Oil Analysis Program will be enhanced to sample the oil for the Switchyard SF_6 compressors and the Reactor Coolant pump oil collection tanks.

   Program Elements Affected: Element 4 (Detection of Aging Effects)

3. The Seabrook Station Lubricating Oil Analysis Program will be enhanced to require the performance of a one-time ultrasonic thickness measurement of the lower portion of the Reactor Coolant pump oil collection tanks prior to the period of extended operation.

   Program Elements Affected: Element 4 (Detection of Aging Effects)

Operating Experience

Seabrook Station has a comprehensive Operating Experience Program that monitors industry issues/events and assesses these for applicability to its own operations. In addition, the Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues/events. While no instances of component failure attributed to lubricating oil contamination or degradation were identified, the following examples demonstrate that the Seabrook Station Lubricating Oil Analysis Program provides prudent recommendations and appropriate corrective actions based on oil analysis results. The program provides input to preventive and corrective maintenance activities to ensure the integrity of the components within the scope of the program.

1. In May 2001, following an oil change in Train "B" Service Water Cooling Tower fan gear boxes, both fans were operated for approximately 1 hour. Vibration data was collected while the fans were running and oil samples were taken within 10 minutes of shut-down. The oil sample taken from fan #2 gear box was much darker in color than the sample from fan #1 gear box. A ferrographic examination of the two samples showed that there was significantly more wear debris in the oil from fan #2. Both fans had similar vibration magnitudes and spectrums and were considered acceptable. The condition was entered into the Corrective Action Program and another oil change was requested.

   During the requested oil change, the gear surfaces were inspected. No abnormal wear was identified. A build up of dark residue, possibly byproducts of oil subjected to elevated temperatures, was noted around the thermowell of the gearbox heater. A sample of this residue was sent to an outside lab for analysis. The results of the analysis showed no increase in iron concentration in the oil sample but noted a polymer gel in the analysis of the residue sample. The lab noted that a friction polymer gel can be created by gear forces which would be embedded with wear particles or a thermal polymer gel can form from exposure to heat sources. Since the polymer did not have embedded wear particles, the lab concluded that the material was created by exposure to heat as initially suspected. To preclude contamination of the oil reservoir with this polymer, the gearbox was cleaned and the gearbox heater was replaced.

In June 2001, after gearbox cleaning and subsequent refilling of reservoir, new samples were taken during fan operation. The results of these samples showed normal oil signatures. The actions taken to clean the heater element and gearbox were successful in correcting the condition. Normal monitoring was re-established.

2. In May 2002, an oil sample was taken from Fire Protection pump, 1-FP-P-20A, per the predictive maintenance program. The oil analysis results indicated that the total base number had decreased indicating the oil was near the end of its life. Based on this test, the oil was changed in May 2002. Following the oil change, a review was performed to adjust the oil change frequency on the Fire Protection pumps (1-FP-P-20A and 20B). Subsequently, the preventive maintenance program was revised to change the oil change frequency on these pumps from *“upon request”* to *“every 18 months”*.

3. In May, 20004, an oil sample taken from 1-FW-P-37A pump outboard bearing indicated elevated iron content and wear particles. Subsequently, vibration data was taken and showed no abnormal trends. Based on discussions with two different laboratories and the FPL St. Lucie program supervisor, the condition report evaluation concluded that the pump outboard bearing was the source of the elevated iron and wear particles. A recommendation was made to inspect or replace the pump outboard bearing. Immediate replacement was not deemed necessary at that time. Accordingly, in December 2004, the pump outboard bearing was replaced on 1-FW-P-37A.

4. In May 2004, the oil sample taken from the “D” Primary Component Cooling Water pump motor inboard bearing indicated that the copper and particle count had increased. Evaluation of the condition determined that the cause of the problem was due to wear of the motor inboard bearing slinger ring. Subsequently, the slinger ring was replaced.

5. On May 5, 2005, an oil sample taken from the “B” Emergency Diesel Generator rocker arm lube oil tank indicated a fuel dilution of 3.7%. No detectable fuel oil should have been present in the rocker arm lube oil system.

An apparent cause evaluation was performed, which concluded that the fuel injector was found to be leaking across the injector tip to injector body mating surface. This mating surface also aligns the cooling water passages. It was determined that the condition was most likely caused by one of two factors:

a. Improper mating surface of the injector tip to injector body.

b. The injector tip nut was under torqued.

As part of the extent of condition review, all sixteen injectors on the “B” Emergency Diesel Generator were observed at full load with the rocker housing covers removed. The two suspect injectors were removed from the “B” Emergency Diesel Generator and tested. There had been no indications of fuel dilution in “A” Emergency Diesel since these nozzles were installed in October of 2003. The injector nozzle maintenance endorsed by the vendor and the owners group was performed on the injectors installed in the “A” Emergency Diesel Generator. Hence, no further actions were deemed necessary on the “A” Emergency Diesel Generator.

Corrective actions included 1) the maintenance procedure was updated to check the torque value of the injector tip nut during Emergency Diesel Generator engine injection nozzle maintenance and 2) the vendor was requested to conduct an evaluation of the failed injector to the determine the cause of this condition.

The vendor review of the condition determined that the tip nut was under torqued. This would have occurred at the vendor’s factory because Seabrook Station does not take the tip off of the injector body. As stated above, Seabrook Station had already incorporated a procedure step to check the tip nut torque prior to installation into the Diesel Generator, which should prevent a recurrence of this condition.

These examples provide objective evidence that the Seabrook Station Lubricating Oil Analysis Program effectively manages aging effects in systems and components within the scope of license renewal by maintaining oil quality within established limits.

Conclusion

The Seabrook Station Lubricating Oil Analysis Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis during the period of extended operation.

B.2.1.27 ASME SECTION XI, SUBSECTION IWE

Program Description

The Seabrook Station ASME Section XI, Subsection IWE Program is an existing program and performs inspections using the same primary Inservice Inspection method as specified in ASME Section XI, Subsection IWE, *“Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Power Plants”*, visual examination (general visual, VT-3, VT-1). IWE specifies acceptance criteria, corrective actions, and expansion of the inspection scope when degradation exceeding the acceptance criteria is found.

Seabrook Station is in the first inspection interval which utilizes the requirements of the 1995 Edition, including the 1996 Addenda, of ASME Section XI, Sub-Section IWE. The components managed by the program include the containment liner, electrical penetrations, mechanical penetrations (piping, ventilation, and spares), personnel lock, equipment hatch, recirculation sump, reactor pit, moisture barriers, seals, gaskets, pressure retaining bolting, and supports.

NUREG-1801, Rev 1, discusses the use of the 2001 edition including the 2002 and 2003 addenda of ASME Section XI code, but allows use of other editions of the ASME Code as long as there is justification. The Seabrook Station ASME Section XI, Subsection IWE Program for the first ten-year inspection interval effective from August 19, 2000 through August 18, 2010, approved per 10 CFR 50.55a, is based on the 1995 edition including the 1996 addenda. The next and subsequent 120-month inspection intervals for Seabrook Station will incorporate the requirements specified in the version of the ASME Code incorporated into 10 CFR 50.55a twelve months before the start of the inspection interval. The Seabrook Station ASME Section XI, Subsection IWE Program is consistent with NUREG-1801 XI.S1.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.S1.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

There is considerable industry operating experience; NRC Information Notice (INs) 86-99, *"Degradation of Steel Containments"*, 88-82, *"Torus Shells with Corrosion and Degraded Coatings and Degraded Coatings in BWR Containments"*, and 89-79, *"Degraded Coatings and Corrosion of Steel Containment Vessels"*, that described occurrences of corrosion in steel containment shells. More recently, NRC IN 97-10, *"Liner Plate Corrosion in Concrete Containment"*, identified specific locations where concrete containments are susceptible to liner plate corrosion.

Seabrook Station engineering has reviewed the containment liner issue from Beaver Valley where inspections during the Beaver Valley refueling outage RFO17 (2006) revealed degradation from the inaccessible side of the steel liner. In addition to the ASME Section XI IWE examinations, Seabrook Station performs routine containment liner visual inspections on a 40 month frequency. No potentially through-liner corrosion issues have been noted.

Several condition reports were found in a search for "*containment liner*" documenting material found to be in contact with the containment liner (e.g., scaffolding, grating hose reels, and outage contractor storage boxes) during outage activities. These were promptly and appropriately dispositioned.

Seabrook Station Nuclear Oversight performed an audit of key activities during Refueling Outage 7 (Fall of 2000). There was only one material related observation from this audit stating that there was a faulty moisture barrier documented at the minus 26' level, azimuth 250°. A condition report was initiated and the barrier repaired.

An IWE inspection in November 2000 documented an observation of debris on top of the moisture barrier behind the shield at the -26' elevation, approx. 200 to 240 degrees. The area required vacuuming in order to complete the IWE examination. This condition report documents the degree of compliance and attention to detail exhibited during implementation of this program.

A November 2001 condition report documented the opportunity that was recognized to complete IWE examinations for an area that had been inaccessible during the refueling outage window for containment liner inspection. The containment recirculation sump had been barricaded during the outage for modifications that were in progress. Upon completion of the sump modifications, the barriers were removed. Station personnel recognized that this now provided an opportunity to complete this portion of the examination. This condition report documents the understanding of the scope of this program and the ability to recognize respective windows of opportunity.

Conclusion

The Seabrook Station ASME Section XI, Subsection IWE Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.28 ASME SECTION XI, SUBSECTION IWL

Program Description

The Seabrook Station ASME Section XI, Subsection IWL Program is an existing program that manages the aging effects of cracking, loss of bond, loss of material (spalling, scaling) due to corrosion of embedded steel, expansion and cracking due to reaction with aggregates, increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack, and increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide and invokes the requirements of ASME Section XI, Sub-Section IWL, "*Requirements for Class CC Concrete Components of Light-Water Cooled Power Plants*". The components managed by the program include steel reinforced concrete for the Seabrook Station containment building and complies with the requirement for examination contained in 10 CFR 50.55a in accordance with ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWL.

NUREG-1801, Rev 1, discusses the use of the 2001 edition including the 2002 and 2003 addenda of ASME Section XI code, but allows use of other editions of the ASME Code as long as there is justification. The Seabrook Station Inservice Inspection Program Plan for the current ten-year inspection interval effective from August 19, 2000 through August 18, 2010, approved per 10 CFR 50.55a, is based on the 1995 edition including the 1996 addenda. The next and subsequent 120-month inspection intervals for Seabrook Station will incorporate the requirements specified in the version of the ASME Code incorporated into 10 CFR 50.55a twelve months before the start of the inspection interval.

The primary inspection methods used at Seabrook Station are VT-1C visual examination, VT-3C visual examination and alternative examination methods (in accordance with IWA-2240). The Seabrook Station ASME Section XI, Subsection IWL Program provides acceptance criteria and corrective actions for each exam type.

As discussed in the NUREG-1801, Chapter 2, plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific aging management program to account for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.

Concrete degradation due to aggressive chemical attack is an aging effect applicable to Seabrook Station. The Seabrook Station Structures Monitoring Program (B.2.1.31) addresses the plan and specific details to determine the effects of aggressive chemical attack on the concrete. An evaluation will be performed after the testing performed in the plan and, if required, actions will be provided using the corrective action process for concrete under Seabrook Station Structures Monitoring and ASME Section XI, Subsection IWL programs.

The Seabrook Station containment is a steel reinforced concrete structure. No prestressed concrete or unbonded post-tensioning systems are used in the Seabrook Station containment.

All accessible containment reinforced concrete components are within the scope of this program. Inaccessible containment concrete portions are exempted from examination (e.g., concrete covered by liner, foundation material, or backfill, or obstructed by adjacent structures or other components) as per Subsection IWL. 10 CFR 50.55a(b)(2)(viii) specifies additional requirements for inaccessible areas. Seabrook Station will evaluate the acceptability of concrete in inaccessible areas when conditions exist in accessible areas that could indicate the presence of or result in degradation to such inaccessible areas. Steel liners and their integral attachments are not within the scope of Subsection IWL, but are included within the scope of ASME Section XI, Subsection IWE (B.2.1.27).

The Seabrook Station ASME Section XI, Subsection IWL Program is an inspection program and no preventive actions are specified. Seabrook Station does not credit a coating program for managing the effects of aging of concrete surfaces.

Seabrook Station procedures provide instructions to perform visual examination of the concrete surfaces of the primary containment in accordance with requirements of Subsection IWL-2500. Seabrook Station does not have concrete surfaces surrounding tendon anchors. Concrete surfaces are inspected by VT-3C visual examination for evidence of damage or degradation such as;

a. Chemical attack, abrasion or erosion sufficient to expose coarse aggregate.

b. Water flowing from, or on the surface of, the concrete (except basement Annulus).

c. Scaling and/or disintegration sufficient to expose coarse aggregate.

d. Cracks, spalls, voids or popouts.

e. Efflorescence, exudation and/or encrustation.

f. Discoloration indicative of corrosion of embedded steel.

g. Exposure of reinforcing steel.

h. Cracking, blistering and/or peeling of coatings.

The scope of examinations is in compliance with 10 CFR 50.55a and Subsection IWL to ensure that aging effects would be detected before they would compromise the design-basis requirements. The frequency of examinations is five years. All accessible concrete surfaces receive a VT-3C visual examination. Areas detected during the VT-3C exams that indicate suspect conditions, receive a more rigorous VT-1C examination. These visual examination methods and testing would identify the aging effects of accessible concrete components at Seabrook Station containment.

Except in inaccessible areas, all concrete surfaces are monitored on a regular basis by virtue of the examination requirements. Seabrook Station procedures provide monitoring and trending information over the life of the plant.

Acceptance criteria in accordance with IWL-3000 for concrete containment are provided in Seabrook Station procedures. For concrete surfaces, the acceptance criteria rely on the determination of the "*Responsible Engineer*" regarding whether there is any evidence of damage or degradation sufficient to warrant further evaluation or repair in accordance with IWL-3300. The acceptance criteria are qualitative. Seabrook Station procedures also require that the Responsible Engineer be a registered professional engineer experienced in evaluating the inservice condition of structural concrete and knowledgeable of the design and construction codes and other criteria used in design and construction of concrete containments.

Repair activities are performed on the concrete containment as specified in Subsection IWL-4000. Testing performed following repair of modifications is done in accordance with Subsection IWL-5000.

NUREG-1801 Consistency

NUREG-1801, Rev 1, discusses the use of the 2001 edition including the 2002 and 2003 addenda of ASME Section XI code, but allows use of other editions of the ASME Code as long as there is justification. The Seabrook

Station Inservice Inspection Program Plan for the current ten-year inspection interval effective from August 19, 2000 through August 18, 2010, approved per 10 CFR 50.55a, is based on the 1995 edition including the 1996 addenda. The next and subsequent 120-month inspection intervals for Seabrook Station will incorporate the requirements specified in the version of the ASME Code incorporated into 10 CFR 50.55a twelve months before the start of the inspection interval.

This program is consistent with NUREG-1801 XI.S2.

Exceptions to NUREG-1801

None

Enhancements

The following enhancement will be made prior to entering the period of extended operation.

1. The Seabrook Station ASME Section XI, Inservice Inspection, Subsection IWL Program implementing procedures will be enhanced to include the definition of *"Responsible Engineer"*.

   Program Elements Affected: Element 6 (Acceptance Criteria).

Operating Experience

Seabrook Station has a comprehensive Operating Experience Program that monitors industry issues/events and assesses these for applicability to its own operations. In addition, the Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues/events.

Preventive maintenance work orders are used for tracking and identifying conditions identified during surveillances. Issues and events, whether external or plant specific, that are potentially significant to containment reinforced concrete at Seabrook Station, or which show deficiencies in excess of acceptance criteria are evaluated.

The Seabrook Station ASME Section XI, Subsection IWL Program is implemented through the Seabrook Station Containment Surface Inspection Program. Some of the results of the inspection conclusions are based on the following reviews:

1. Containment inspections performed during Refueling Outage 8 (Spring of 2002) were completed satisfactorily with no indication of degradation of the concrete surfaces.

2. Containment inspections performed during Refueling Outage 10 (Spring of 2005) were completed satisfactorily with no indication of degradation of the concrete surfaces.

3. Containment inspections performed during Refueling Outage 12 (Spring of 2008) were completed satisfactorily with no indication of degradation of the concrete surfaces.

The Containment Structure concrete has been found to be in good condition during inspections performed in accordance with ASME Section XI, Subsection IWL. There is sufficient confidence that the implementation of the ASME Section XI, Subsection IWL program will effectively identify degradation prior to failure. Appropriate guidance for reevaluation, repair, or replacement is provided if degradation is found.

Conclusion

The Seabrook Station ASME Section XI, Subsection IWL Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.29 ASME SECTION XI, SUBSECTION IWF

Program Description

The Seabrook Station ASME Section XI, Subsection IWF Program is encompassed by Seabrook Station *“Inservice Inspection Reference Manual”*, Inservice Inspection (ISI) Visual Examination Procedure, and Station Procedure *“Inservice Inspection of Class 1, 2, and 3 Components”*, which invoke the requirements of ASME Section XI, Sub-Section IWF, “*Requirements for Class 1,2,3 and MC Component Supports of Light-Water Cooled Power Plants*”. The program specifies the percentage of supports that must be examined. For supports, other than piping supports, the supports of only one component of a group having similar design, function, and service must be examined. Supports of piping and other items exempted from volumetric or surface examination are also exempt.

The Code of Federal Regulations, 10 CFR 50.55a, *“Codes and Standards”,* requires that Inservice Inspection of ASME Code Class 1, 2, and 3 pressure retaining components, their integral attachments and supports be conducted in accordance with the latest edition of ASME Section XI approved by the NRC twelve months prior to the start of a ten-year interval. The Inservice Inspection Program for the second (2^{nd}) ten-year interval, which began on August 19, 2000 for Seabrook Station, implements the 1995 edition with the 1996 addenda, of ASME Section XI. The program is implemented in accordance with the requirements of 10 CFR 50.55a, with specified limitations, modifications and NRC-approved alternatives.

As specified by the Inservice Inspection Reference Manual, the program uses VT-3 visual examination for detection of degradation. The performance requirements for VT-3 visual examination are provided in Inservice Inspection (ISI) Visual Examination Procedure. Per this procedure, VT-3 visual examinations are conducted to determine the general mechanical and structural condition of components including bolting and their supports by verifying parameters such as clearances, settings, and physical displacement, and to detect discontinuities and imperfections, such as loss of integrity of bolted or welded connections, loose or missing parts, debris, corrosion, wear, or erosion.

The Seabrook Station ASME Section XI, Subsection IWF Program is implemented on a 10-year cycle. The program implements the requirements for inservice inspection of ASME Class 1, 2, and 3 supports.

The sample of pipe supports to be inspected is based on Table IWF-2500-1 which specifies that 25% of the Class 1 supports for the nonexempt Class 1 piping; 15% of the Class 2 supports for the nonexempt Class 2 piping; 10% of the Class 3 supports for the nonexempt Class 3 piping; and 100% of the Class 1, 2, 3, and MC supports other than piping supports are to be examined.

The supports to be selected and examined for components (vessels, pumps, etc.), are the supports for the components that are required to be examined under IWB-2500, IWC-2500, IWD-2500, and IWE-2500.

Supports exempt from the examination requirements of IWF-2000 are those connected to piping and other items exempted from volumetric, surface, or VT-1 or VT-3 visual examination by IWB-1220, IWC-1220, IWD-1220, and IWE-1220. In addition, portions of supports that are inaccessible by being encased in concrete, buried underground, or encapsulated by guard pipe are also exempt from the examination requirements of IWF-2000, in accordance with IWF-1230.

The same supports are inspected in each 10-year inspection interval, to the extent practical. The examinations listed above are based on specific Code Editions and Addenda and may change throughout the extended period as required and/or allowed by 10 CFR 50.55a.

The Seabrook Station ASME Section XI, Subsection IWF Program is an inspection program and no preventive actions are specified.

For piping and component support inspections, unacceptable conditions, as described in Seabrook Station ASME Section XI, Subsection IWF Program, are noted for correction or further evaluation. Supports are not monitored and trended for time dependent degradation.

The Seabrook Station ASME Section XI, Subsection IWF Program for component supports utilizes the acceptance standards for visual examination specified in ASME Section XI, Subsection IWF-3410. The following conditions have been identified as unacceptable:

a. Deformations or structural degradations of fasteners, springs, clamps, or other support items;

b. Missing, detached, or loosened support items;

c. Arc strikes, weld spatter, paint, scoring, roughness, or general corrosion on close tolerance machined or sliding surfaces;

d. Improper hot or cold positions of spring supports and constant load supports;

e. Misalignment of supports; and

f. Improper clearances of guides and stops.

Additional examinations will be performed in accordance with IWF-2430 when examinations reveal indications exceeding the acceptance standards. If a component support is accepted for continued service in accordance with IWA-2110(a)(1)(i) and IWF-2420(b) and (c) the component support will be reexamined during the next inspection period.

NUREG-1801 Consistency

NUREG-1801, Rev 1, discusses the use of the 2001 edition including the 2002 and 2003 addenda of ASME Section XI code, but allows use of other editions of the ASME Code as long as there is justification. The Seabrook Station Inservice Inspection Program Plan for the second ten-year inspection interval effective from August 19, 2000 through August 18, 2010, approved per 10 CFR 50.55a, is based on the 1995 edition including the 1996 addenda. The next and subsequent 120-month inspection intervals for Seabrook Station will incorporate the requirements specified in the version of the ASME Code incorporated into 10 CFR 50.55a twelve months before the start of the inspection interval.

This program is consistent with NUREG-1801 XI.S3.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

A review of the plant specific operating experience found instances of selected supports being deficient, but operable. These conditions were reported and evaluated in accordance with the Corrective Action Program. There is reasonable assurance that the Seabrook Station ASME Section XI, Subsection IWF Program will be effective through the period of extended operation. Examples supporting this conclusion include:

1. Inservice Inspection activities conducted during Refueling Outage 5 (Spring of 1997) resulted in thirteen condition reports documenting thirty-six support deficiencies that were identified in *“OR05 (Refueling Outage 5) Inservice Inspection Document Package”*. All deficiencies were evaluated and dispositioned by Engineering.

2. In 1999, an *“Inservice Inspection Examination Report”* was generated to document the results of the Inservice Inspections conducted during Refueling Outage 6 (Spring of 1999). The report identifies five supports with deficient conditions. These were reported to Engineering on condition reports. All were found to be acceptable by engineering evaluation, based on conformance with design tolerances.

3. During Refueling Outage10 (Spring of 2005), twenty eight supports were selected for Inservice Inspection. According to *“OR10 (Refueling Outage 10) Inservice Inspection Document Package”*, no deficiencies requiring further evaluation were identified.

These examples provide objective evidence that the Seabrook Station ASME Section XI, Subsection IWF Program is effective in identifying and evaluating conditions which may challenge the ability of ASME Section XI supports to perform their intended function.

Conclusion

The Seabrook Station ASME Section XI, Subsection IWF Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.30 10 CFR PART 50 APPENDIX J

Program Description

The Seabrook Station 10 CFR Part 50, Appendix J Program is an existing performance based containment leak rate test program as described in the Seabrook Station Technical Requirements Program and Leakage Test Reference Manual.

The Seabrook Station Containment Leakage Rate Testing Program, required by Seabrook Station Technical Specification, implements Option B of Appendix J of 10 CFR Part 50, *"Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors"*. The test requirements of Appendix J provide for periodic verification by tests of the leak-tight integrity of the primary reactor containment. The purposes of the tests are to assure that 1) leakage through the containment or systems and components penetrating the containment does not exceed the allowable leakage rate specified in the Technical Specifications and Updated Final Safety Analysis Report, and 2) integrity of the containment structure is maintained during its service life.

10 CFR Part 50 Appendix J, Option B applies guidance provided in NRC RG 1.163, *"Performance-Based Containment Leak-Test Program*", for performance based leak testing. NRC RG 1.163 accepts methods provided in NEI 94-01, *"Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J",* for implementing performance based testing with restrictions. NRC RG 1.163 also accepts the methods and techniques for performing Type A, B and C tests contained in ANSI/ANS-56.8-1994, *"Containment System Leakage Testing Requirements".* The Seabrook Station Leakage Test Reference is based on the guidance provided in NEI 94-01 and ANSI / ANS-56.8-1994 with the restrictions identified in RG 1.163.

The Seabrook Station 10 CFR Part 50 Appendix J Program includes integrated and local leak rate tests of components that make up the primary containment pressure boundary. The program includes Type A, B, and C type testing as described in 10 CFR Part 50, Appendix J.

The Seabrook Station 10 CFR Part 50 Appendix J Program is a containment leak rate monitoring program and does not specify preventive actions. The test requirements of Appendix J provide for periodic verification by tests of the leak-tight integrity of the primary reactor containment. The Seabrook Station 10 CFR Part 50 Appendix J Program, in conjunction with the implementation of programs ASME Section XI, Subsection IWE Program (B.2.1.27), and ASME Section XI, Subsection IWL Program (B.2.1.28), provides an aging management program that is effective at detecting degradation of the containment boundary.

Periodic integrated leakage rate tests (Type A tests) are conducted in accordance with the UFSAR Section 6.2.6, Containment Leak Rate Testing and Technical Specification 4.6.1, Primary Containment - Containment Integrity. These tests monitor leakage rates through primary containment shells, liners, penetrations, fittings, access openings, and the isolation valves.

Type B tests are required on all containment penetrations with resilient seals, gaskets, or expansion bellows. These include, but are not limited to, air locks, air lock door seals, piping penetrations with expansion bellows and blind flanges, and electrical seals.

Type C tests are required on all lines that penetrate the primary containment and present a potential leakage path between the inside and outside atmospheres of the primary containment under postulated accident conditions.

The Seabrook Station acceptance criteria for containment leakage rates are defined in plant technical specifications and technical requirements. The Seabrook Station 10 CFR Part 50 Appendix J Program ensures that the containment leakage meets the defined acceptance criteria.

During Appendix J testing, if leakage rates do not meet the acceptance criteria, corrective actions are taken in accordance with 10 CFR Part 50, Appendix J, and NEI 94-01. An evaluation is performed to identify the cause of the unacceptable performance and appropriate corrective actions are taken to restore the leakage to an acceptable level. When excessive leakage results in corrective actions to repair a degraded condition, leak rate testing is performed after completion of repairs to confirm that the deficiency has been corrected.

The Appendix J Program monitors the results of the type A, B and C leak rate tests to demonstrate that the acceptance criteria for leakage have been satisfied. The test results that exceed the performance criteria are assessed as required by 10 CFR 50.72, "*Immediate Notification Requirements for Operating Nuclear Power Reactors*" and 10 CFR 50.73, "*Licensee Event Report System*."

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.S4.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

To date the industry wide 10 CFR Part 50, Appendix J, leak rate testing programs have been effective in preventing unacceptable leakage through the containment pressure boundary Seabrook Station implementation of Option B for testing frequency is consistent with plant operating experience. The examples below demonstrate the effectiveness of the Seabrook Station leak rate testing program in identifying and correcting conditions that could lead to unacceptable containment pressure boundary leakage.

1. During Refueling Outage 9 (Fall of 2003) performance of the as-found local leak rate test for the Containment On-line Purge penetration the leakage rate was determined to have increased from the previous test in August 2001. Immediate evaluation of this condition determined that the inside containment isolation valve was responsible for the leakage. The actuator and quick exhauster diaphragm of this valve were replaced and the penetration retested. The leak rate remained unchanged. Subsequently, the inside containment isolation valve was replaced with a spare valve and the penetration retested. The as-left local leak rate test results were acceptable and comparable to those from the test performed in 2001.

2. During Refueling Outage 10 (Spring of 2005), fifty-three penetrations were tested and the results were compared to local leak rate test results performed during previous outages. Any changes in the results were evaluated. As a result of this comparative review, there were no degrading trends attributed to the containment isolation valves. However, during the performance of the local leak rate test for Combustible Gas Control Purge Exhaust penetration, the test results indicated an increase in leakage from Refueling Outage 7 (Fall of 2000). Both valves in the penetration indicated approximately the same leakage. It was determined that this can occur when a test boundary valve is leaking. The boundary valves were checked with liquid leak detector and one valve was found to have a packing leakage. Having identified the leakage path, the penetration was accepted. The leaking test boundary valve was repacked during Refueling Outage 12 (Spring of 2008).

3. During Refueling Outage 11 (Fall of 2006), twelve Type B penetrations and twenty-one Type C penetrations were tested. There were no major issues identified during the refueling outage but there was an increasing leakage trend noted on both of the Containment On-line Purge penetrations. A condition report was generated to evaluate this change observed during Refueling Outage 11. The penetration leakage rate was well within acceptable limits and the noted increase was determined to be acceptable.

4. During Refueling Outage 12 (Spring of 2008), seven Type B penetrations and twenty-eight Type C penetrations were tested. There were no major issues identified but one of the Containment On-line Purge penetrations still showed an increase in leak rate from Refueling Outage 11 (Fall of 2006). The leakage was evaluated and determined to be still acceptable and therefore, no corrective maintenance work was performed on the valves. The Containment On-Line Purge penetrations are tested each refueling outage. The results of these tests are trended by engineering to ensure that leakage rates will not exceed acceptance criteria or challenge the ability of the penetration valves to perform their intended function.

5. A 2008 condition report identified that the containment equipment hatch airlock barrel test and the test on the other testable penetrations are performed on an every other refueling outage frequency. This frequency requires the use of the allowable grace period to perform these during a refueling outage. To ensure that the grace period is not routinely used, these tests were rescheduled to be performed every refueling outage. This action is consistent with the Appendix J Program Owner’s Group Technical Position Paper 2004-03 regarding the use of the 25% grace period.

These examples provide objective evidence that the Seabrook Station 10 CFR Part 50, Appendix J program is effective in preventing unacceptable leakage through the containment pressure boundary by monitoring, testing and evaluation of system and component conditions.

Conclusion

The Seabrook Station 10 CFR Part 50, Appendix J Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.31 STRUCTURES MONITORING PROGRAM

Program Description

The Seabrook Station Structures Monitoring Program is an existing program that will be enhanced to ensure provision of aging management for structures and structural components including bolting within the scope of this program. The Structures Monitoring Program is implemented through the Seabrook Station Maintenance Rule Program, which is based on the guidance provided in NRC Regulatory Guide 1.160, Revision 2, *”Monitoring the Effectiveness of Maintenance at Nuclear Power Plants”* and NUMARC 93-01, Revision 2, *”Industry Guidance for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants”.* The Seabrook Station Structures Monitoring Program was developed using the guidance of these two documents to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function.

The Seabrook Station Structures Monitoring Program includes periodic visual inspection of structures and structural components for the detection of aging effects specific for that structure. These inspections are completed by qualified individuals at a frequency determined by the characteristics of the environment in which the structure is found. A structure found in a harsh environment is defined as one that is in an area that is routinely subject to outside ambient conditions, very high temperature, high moisture or humidity, frequent large cycling of temperatures, frequent exposure to caustic materials, or extremely high radiation levels. For structures in these harsh environments, the inspection is conducted on a five year basis (plus or minus one year due to outage schedule and two inspections within ten years). Structures not found in areas qualifying as a harsh environment are classified as being in a mild environment, and are inspected on a ten year basis (plus or minus one year due to outage schedule and two inspections within twenty years).

Individuals conducting the inspection and reviewing the results are qualified per the Seabrook Station Structures Monitoring Program, which is in accordance with the requirements specified in ACI 349.3R-96, *"Evaluation of Existing Nuclear Safety related Concrete Structures"*. Individuals conducting the inspection and reviewing the results are to possess expertise in the design and inspection of steel, concrete and masonry structures. These individuals must either be a licensed Professional Engineer experienced in this area, or will work under the direction of a licensed Professional Engineer experienced in this area.

Detection of aggressive subsurface environments will be completed through the sampling of groundwater. This procedure monitors groundwater for chloride concentration, sulfate concentration and pH on a 5 year basis

Examination of inaccessible areas, such as buried concrete foundations, will be completed during inspections of opportunity or during focused inspections. An evaluation of these opportunistic or focused inspections for buried concrete will be performed under the Maintenance Rule Program every 5 years (if no opportunistic inspection was performed during a 5-year period, a focused 5 year inspection is required) to ensure that the condition of buried concrete foundations on site is characterized sufficiently to provide reasonable assurance that the foundations on site will perform their intended function through the period of extended operation. Additional inspections may be performed in the event that an opportunistic or focused inspection or visible portions of the concrete foundation reveal degradation and will be entered into the Corrective Action Program (CAP).

Concrete structures were constructed equivalent to recommendations in ACI 201.2R, *"Guide for Making a Condition Survey of Concrete in Service".* Loss of material due to leaching of calcium hydroxide is considered to be an aging effect requiring management for Seabrook Station. There have been indications of leaching in below grade concrete in Seabrook Station structures. Leaching of calcium hydroxide from reinforced concrete becomes significant only if the concrete is exposed to flowing water. Resistance to leaching is enhanced by using a dense, well-cured concrete with low permeability. These structures are designed in accordance with ACI 318 and constructed in accordance with ACI 301 and ASTM standards. Nevertheless, Seabrook Station manages loss of material due to leaching of calcium hydroxide with visual inspection through the Structures Monitoring Program.

Seabrook Station has scheduled specific actions to determine the effects of aggressive chemical attack due to high chloride levels in the groundwater. Seabrook Station has scheduled concrete testing during the second and third quarter of 2010. An evaluation will be performed based on the results of the testing and a determination of the concrete condition which may lead to additional testing or increased inspection frequency. Testing of concrete may consist of the following:

a. concrete core samples

b. penetration resistance tests

c. petrographic analysis of the concrete core samples

d. visual inspection of rebar as they are exposed during the concrete coring

Seabrook will evaluate the results of the testing and, if required, undertake additional corrective actions in accordance with the Structures Monitoring Program CAP.

The Seabrook Station Structures Monitoring Program does not credit protective coatings for management of aging effects on structures and structural components within the scope of this program.

There are no preventative actions specified in the Seabrook Station Structures Monitoring Program, which includes implementation of NUREG-1801 XI.S5, XI.S6, and XI.S7. These are monitoring programs only.

The parameters monitored in the Seabrook Station Structures Monitoring Program are in agreement with ACI 349.3R-96 and ASCE 11-90, "*Structural Condition Assessment of Buildings*".

Concrete deficiencies are classified using the criteria specified in the Seabrook Station Structures Monitoring Program, which is based on the guidance provided in ACI 201.1R-2, "*Guide for Making a Condition Survey of Concrete in Service*".

As noted in the Seabrook Station response to NRC IN 98-26, *"Settlement Monitoring and Inspection of Plant Structures Affected by Degradation of Porous Concrete Subfoundations"*, porous concrete was not used in the construction of building sub-foundations at Seabrook.

Monitoring of structures and structural components in the scope of the Seabrook Station Structures Monitoring Program is performed in compliance with Regulatory Position 1.5 of NRC Regulatory Guide 1.160 The condition of all structures within the scope of this program is assessed on a periodic basis as specified by 10 CFR 50.65. Structures that do not meet their design basis at the time of inspection due to the extent of degradation, or that may not meet their design basis at the next normally scheduled inspection due to further degradation without intervention are entered into the Corrective Action Program and evaluated for corrective action and/or additional inspections as delineated in 10 CFR 50.65(a)(1). In addition, structures may also be scheduled for follow-up inspections following the completion of any corrective actions to that structure.

The condition of any structure subject to additional inspections or corrective actions is recorded through Seabrook Station Structures Monitoring Program reports to provide a basis for scheduling additional inspections and any required corrective actions in the future, as specified the Seabrook Station Structures Monitoring Program.

Structures that are determined to be acceptable under the Maintenance Rule structural inspections are monitored as specified in 10 CFR 50.65(a)(2).

Evaluations of a structure's condition assess the extent of any degradation of the structural member in accordance with industry standards and the judgment of the qualified individuals performing the inspections.

The acceptance guidelines in the Seabrook Station Structures Monitoring Program are a three-tier hierarchy similar to that described in ACI 349.3R-96, which provides quantitative degradation limits. Under this system, structures are evaluated as being acceptable, acceptable with deficiencies, or unacceptable. Evaluations of a structure's condition are completed according to the guidelines set forth in the Seabrook Station Structures Monitoring Program.

XI.S5 – Masonry Wall Program

The existing Seabrook Station Structures Monitoring Program also integrates the required elements of NUREG-1801 XI.S5 Masonry Wall Program.

There are no block or concrete masonry walls utilized in any category I structures at Seabrook Station. Therefore, requirements of NUREG-1801 XI.S5 including NRC IE Bulletin (IEB) 80-11, *"Masonry Wall Design"* and IN 87-67, *"Lessons Learned From Regional Inspections of License Actions in Response to IE Bulletin 80-11"* are not applicable at Seabrook Station. The masonry walls in the structures/buildings (Fire Pump House; Nonessential switchgear room; Turbine Building, and Yard Structure Station Blackout) performing non-(a)(1) functions are monitored under the Structures Monitoring Program portion of the Maintenance Rule Program, including the attributes as specified in XI.S5.

The primary parameter monitored for masonry walls is cracking of the walls.

Monitoring for cracking and degradation of masonry walls at Seabrook Station is completed through periodic visual inspections conducted under the Seabrook Station Structures Monitoring Program.

Acceptance criteria for non-safety-related masonry walls within the scope of this program are based upon the extent of cracking or other wall degradation. The ability of the masonry wall to perform its intended function is evaluated in the Structures Monitoring Program.

XI.S7 – Inspection of Water Control Structures Associated with Nuclear Power Plants

The existing Seabrook Station Structures Monitoring Program also integrates the required elements of NUREG-1801 XI.S7 and RG 1.127, *"Inspection of Water Control Structures Associated with Nuclear Power Plants"*. The recommendations of Regulatory Guide 1.127 are met by implementing an appropriate inservice inspection and surveillance program for the flood protective structures and the Water Control Structures.

Flood protective structures (stone revetments, reinforced concrete vertical seawall and the sheet pile retaining wall) are within the scope of this program and are inspected under the Maintenance Rule Program.

Water Control Structures (includes Service Water Cooling, Service Water Pump House and Circulating Water Pump House Building (below elevation

21’-0), and Intake & Discharge Transition Structures) are inspected under the Maintenance Rule Program.

Periodic visual inspections of Water Control Structures and Flood Protective Structures are conducted by the Seabrook Station Structures Monitoring Program. The visual inspections will detect cracking; movement due to settlement, heaving or deflection; conditions at junctions with abutments and embankments, erosion, cavitation, seepage, and leakage.

Monitoring for aging effects on flood protective structures and Water Control Structures is completed through periodic visual inspections conducted under the Seabrook Station Structures Monitoring Program.

The acceptance of the flood protective structures and Water Supply Structures condition is evaluated according to the criteria set forth in the Seabrook Station Structures Monitoring Program. This criterion includes the evaluation of concrete deficiencies in accordance with ACI 201.1R-2 and as described above in the Structures Monitoring Program, which is in accordance with ACI 349.3R-96.

There are no earthen structures at Seabrook Station within the scope of this program.

NUREG-1801 Consistency

This existing program is consistent with NUREG-1801, Chapter XI, Programs XI.S5, XI.S6, and XI.S7.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be made prior to entering the period of extended operation.

1. Enhance procedure to add the aging effects, additional locations, inspection frequency and ultrasonic test as follows:

    a. Elastomers: Loss of sealing, leakage, deterioration for CEVA seals only, Aluminum: Cracking, Non-Metallic Fire Proofing: Abrasion and Flaking, Lubrite: Corrosion, Distortion, Dirt etc.

Additional Locations

a. Overhead and Fuel Handling Cranes and NUREG-0612 Cranes, All supports, Tanks 1-FP-TK-35-A, 1-FP-TK-35-B, 1-FP-TK-36-A, 1-FP-TK-36-B, 1-FP-TK-29, and their supports and foundations, Fire Pump House Boiler Building,

b. Safety-Related and Non-Safety-Related Electrical Cable Manhole, Duct Bank Yard Structures

c. A below grade inspection for buried concrete is required at least once every 5 years and it may either opportunistic or focused inspection due do aggressive groundwater inleakage.

Ultrasonic Testing Inspections

a. Perform Ultrasonic testing inspections and evaluation of the internal bottom surface of the two Fire Protection Water Storage Tanks within 5 years prior to the period of extended operation (in support of Aboveground Steel Tanks program).

Program Elements Affected: Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), Monitoring and Trending (Element 5).

2. Enhance procedure to include inspection of opportunity when planning excavation work that would expose inaccessible concrete.

   a. Procedure SH 6.4, “Dig Safe” will be enhanced to include inspection of opportunity when planning excavation work that would expose inaccessible concrete.

   Program Elements Affected: Element 1 (Scope of Program), Element 3 (Parameters Monitored/Inspected).

Operating Experience

1. XI.S6 – Structures Monitoring Program

Structures Monitoring Program is an existing program that was established in 1996 in response to the Regulatory requirements resulting from the establishment of the Maintenance Rule, 10 CFR 50.65. Upon completion of this program, a baseline inspection was completed for both online and outage-accessible structures found in mild and harsh environments at Seabrook Station.

According to the Periodic Assessments of the Maintenance Rule Program *“October 2004 through March 2006”*, and *“April 2006 through March*

2008", the baseline inspection was performed at Seabrook Station from November 1995 to June 1996 of online-accessible structures included concrete, masonry, and steel structures used to house plant equipment. This included the walls, floors, and roofs of buildings, along with the pedestals of mechanical and electrical equipment. The second series of inspections was conducted in 2001, with the most current inspections completed in 2006. The results of this inspection are identified under various preventive maintenance work orders for structures monitoring walkdowns.

The Seabrook Station Maintenance Rule Program is reviewed by an Expert Panel at least once every refueling cycle, not to exceed an interval of 24 months between assessments, in accordance with 10 CFR 50.65(a)(3).

Ground water testing performed in November 2008 and September 2009 found pH values between 6.01 and 7.51, chloride values between 19 ppm and 3900 ppm, and sulfate values between 10 ppm and 100 ppm. Aggressive chemical attack becomes a concern when environmental conditions exceed threshold values (Chlorides > 500 ppm, Sulfates >1500 ppm, or pH < 5.5). Seabrook Station is not located in areas exposed to sulfate attack, nor is it located near industrial plants whose emissions could alter environmental parameters, but is exposed to chloride attack.

Seabrook Station has experienced groundwater infiltration through cracks, capillaries, pore spaces, seismic isolation joints and construction joints in the concrete walls and floor slabs of below-grade concrete structures.

Various materials and methods have been utilized for remediation of groundwater infiltration. For example, Seabrook Station installed below-grade dewatering wells that are included in the Dewatering System. These wells were designed to pump down groundwater levels to reduce the static hydraulic head on the outside concrete. The wells were successful at reducing inleakage. Other remediation methods include the application of waterproofing materials, such as:

a. Vandex waterproofing

b. De Neef Chemical Corporation's Denepox I-40, Denepox I-300, and Denepox Rapid Gel epoxy.

c. De Neef Chemical Corporation's polyurethane resin systems including: Hydro Active Cut, Hydro Active Flex, Hydro Active Flex SLV, and Hydro Active Sealfoam.

d. Aqua-Tech W.P. for waterproofing exterior concrete surfaces above grade.

Currently, three cementitious products manufactured by Xypex Chemical Corporation are approved and authorized for use at Seabrook Station. The Xypex products are: Xypex Concentrate, Xypex Modified and Xypex Patch'N Plug. The Xypex products have had limited success in reducing groundwater infiltration.

An Engineering Evaluation was performed in 1987 for "Corrosion of Concrete Reinforcing Steel Due to Groundwater Inleakage". This evaluation was performed to evaluate the long term corrosion effects on reinforcing steel due to cracking of concrete walls and inleakage of groundwater. The Engineering Evaluation concluded that inleakage through cracks in concrete walls at Seabrook Station would not lead to corrosion of reinforcing steel on either a short-term or a long-term basis. The Engineering Evaluation found that the environment of the concrete remains non-corrosive due to the low chloride concentration in the concrete placed during construction and the low concentration of chlorides in the groundwater on site. In addition, the Engineering Evaluation concluded that site conditions are such that, even if the passive environment of the concrete had been impaired, corrosion of reinforcing steel would not occur due to the lack of necessary oxygen to complete the electro-chemical process.

The groundwater testing discussed above indicated chloride levels in the aggressive range for concrete. As a result, additional testing, as described below, is planned to validate the existing Engineering Evaluation. Specifically, Seabrook Station will perform concrete testing during the second quarter of 2010, in areas that have experienced groundwater infiltration, to determine the effects of aggressive chemical attack on structural concrete. The concrete testing will consist of the following:

a. Concrete core samples

b. Penetration resistance testing

c. Petrographic analysis on concrete core samples

d. Visual inspection of rebar as they are exposed during the concrete coring

The testing is intended to demonstrate whether the concrete and reinforcing steel show any indication of degradation that could, in time, lead to a loss of capacity of the concrete to perform its intended functions. Based on the results of the testing, the Seabrook Station Structures Monitoring Program will evaluate the need for additional measures, such as additional testing of the type listed above, the imposition of a five-year frequency of the type of testing listed above, or other remedial actions. Other actions may include the implementation of an aggressive crack and void sealing program and/or water sealing of entire walls. All actions will be based on the guidelines of ACI-349.3R-96 and evaluated by a registered professional engineer, knowledgeable in the design, evaluation, and in-service inspection of concrete structures and performance requirements of nuclear safety-related structures.

The actions discussed above provide reasonable assurance that the Structures Monitoring Program will manage the aging effects of concrete and reinforcing steel such that they will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation

2. *XI.S5 – Masonry Wall Program*

There are no block or concrete masonry walls utilized in any category I structures at Seabrook Station. The masonry walls in the structures/buildings (Fire Pump House; Nonessential switchgear room; Turbine Building, and Yard Structure SBO) performing non-(a)(1) functions are monitored as required. NRC IE Bulletin 80-11 and NRC IN 87-67 require actions to *"to ensure that the evaluation basis for a wall is not invalidated through a physical plant change or system reclassification"*. The design control process assures no changes are made to the status of any block walls. Visual inspection of non-safety related masonry includes examination for any cracking and degradation of masonry walls within the areas listed in the Monitoring Checklist of Structures Monitoring Program portion of the Maintenance Rule Program.

3. *XI.S7 – Inspection of Water Control Structures Associated with Nuclear Power Plants*

During refueling Outage 11 (Fall of 2006), divers discovered concrete debris in the Circulating Water Pump House Forebay during the scheduled inspection. Site engineering evaluated the impact on the Circulation Water structure and concluded that there is no effect on the structural integrity of the Circulating Water Pump House. During this inspection no other concrete degradation was reported.

The condition of the Water Control Structures and Flood Protection Structures at Seabrook Station has been assessed through visual inspection conducted through Structure Monitoring Program procedures in the Maintenance Rule Program.

The Maintenance Rule inspections began in 1996 with the initial baseline inspection, as described previously.

The deficiencies that were recorded during these baseline inspections were evaluated by Seabrook Station personnel in accordance with the Maintenance Rule Program. The evaluation included a review of the deficiency report and initiation of any necessary corrective actions.

A review of both operating experience at Seabrook Station and the results of the Maintenance Rule Program inspections did not indicate any adverse degradation of Water Control Structures or Flood Protection Structures.

Conclusion

The Seabrook Station Aging Management Program for Structures Monitoring provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operations.

B.2.1.32 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 EQ REQUIREMENTS

Program Description

The Electrical Cables and Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Program is a new program that will manage the aging effects of embrittlement, cracking, discoloration or surface contamination leading to reduced insulation resistance or electrical failure of accessible cables and connections due to exposure to an adverse localized environment caused by heat, radiation or moisture in the presence of oxygen. This program applies to accessible cables and connections installed in in-scope structures.

The program consists of a visual inspection of the cable or connections exterior surfaces. Accessible electrical cables and connections exposed to adverse localized environments or ambient conditions in excess of 60-year service limiting environments will be visually inspected for signs of accelerated age related degradation.

Connections included in the scope of this program are splices, terminal blocks, connectors, and the insulation portion of fuse blocks.

This program considers the technical information and guidance provided in the following:

a. NUREG/CR-5643, *"Insights Gained From Aging Research"*

b. IEEE Std. P1205, *"IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations"*

c. SAND96-0344, *"Aging Management Guidelines for Commercial Nuclear Power Plants – Electrical Cable and Terminations"*

d. EPRI TR-109619, *"Guideline for the Management of Adverse Localized Equipment Environments"*

An Adverse Localized Environment is a condition in a limited plant area that is significantly more severe than the specified service environment (i.e. temperature, radiation, or moisture) for the cable or connections. An adverse variation in environment is significant if it could appreciably increase the rate of aging of a component or have an immediate adverse effect on operability.

Seabrook Station has determined that Polyvinyl Chloride has the limiting temperature and radiation thresholds of all cable and connection material. The ambient temperature and radiation threshold values for Polyvinyl Chloride are 112°F (44.2°C) and 2×10^7 Rads. Seabrook Station has chosen these limiting temperature and radiation values to define the threshold for adverse localized environments.

The scope of the Electrical Cables and Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Program includes insulated cable and connections identified in walkdowns that will be performed utilizing the guidance provided in EPRI TR-109619. The inspection area includes all buildings or structures that are in-scope for License Renewal. The walkdown of the in-scope buildings or structures will include a temperature measuring method such as thermography to assist in identifying adverse localized environments. Accessible insulated cable and connections within the in-scope buildings or structures which contain temperatures or radiation values that are equal to or exceed 112°F (44.2°C) or 2×10^7 Rads identified during the walkdown will be inspected for surface anomalies.

The non-EQ insulated cables and connections managed by this program will include power, instrumentation, control, and communication applications located in accessible adverse localized environments throughout the plant. Accessible is defined as those cables and connections that can be viewed from ground level and without opening electrical enclosures.

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is an inspection program and contains no actions to prevent or mitigate aging degradation.

This program will visually inspect accessible electrical cables and connections installed in adverse localized environments at least once every 10 years. The first inspection for license renewal is to be completed before the period of extended operation.

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program requires that accessible insulated cables and connections are free from unacceptable, visual indications of cable and connection surface anomalies, such as embrittlement, discoloration, cracking, or surface contamination, which suggest that conductor insulation or connection insulation degradation exists. The Seabrook Station program defines an unacceptable indication as a noted condition or situation that, if left unmanaged, could lead to a loss of the intended function.

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program requires that all unacceptable visual indications of cable and connection surface anomalies be entered into the Corrective Action Program and be subjected to an engineering evaluation. The engineering evaluation will consider the age and operating environment of the component, as well as the severity of the anomaly and whether such an anomaly has previously been correlated to degradation of conductor insulation or connections. If cable and connection surface anomalies are detected, the corrective actions may include, but are not limited to, testing, shielding or otherwise changing the environment, or relocation or replacement of the affected cable or connection. When an unacceptable condition or situation is identified, a determination is made as to whether the same condition or situation is applicable to other accessible or inaccessible cables or connections.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.E1.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Plant-specific and industry wide operating experience was considered in the development of this program. The review of plant-specific and industry-wide operating experience ensures that the corresponding NUREG-1801, Chapter XI.E1 Program will be an effective Aging Management Program for the period of extended operation.

1. This program considered the operating experience in NUREG-1801, Chapter XI, Section E1. Industry operating experience noted in NUREG-1801 has shown that adverse localized environments caused by heat, radiation or moisture for electrical cables and connections have been shown to exist and have been found to produce degradation of insulating materials that is visually observable. These visual indications, such as color changes or surface cracking, can be used as indicators of degradation. This demonstrates that Seabrook Station considered industry operating experience in the preparation of this program.

2 As nuclear plants approach or enter the period of extended operation, several utilities have begun to implement their Electrical Aging Management Programs. Seabrook Station License Renewal personnel are actively involved in industry groups such as the NEI License Renewal Electrical Working Group. Experience of other utilities is shared in this working group. As an example, several plants presented the results of their GALL Section XI.E1 programs at the 2009 and 2010 License Renewal Electrical Working Group meeting. This operating experience demonstrates that Seabrook Station actively participates in industry activities relative to the subject program.

3. Plant operating experience has shown that the Corrective Action Program has addressed issues of cable degradation in recent years. Cables have been identified with degraded insulation, primarily as a result of exposure to excessive localized overheating. For example, insulated cable associated with heater terminations was found to be degraded. Also, power cords to various non-essential instruments and wiring internal to lighting fixtures were found to be cracked. Seabrook Station is continuing to monitor for degraded connections and is systematically replacing the power cords and internal lighting wire. This operating experience demonstrates that plant-specific operating experience was used in the development of this program.

4. Seabrook Station Plant Engineering Guidelines for system walkdowns includes steps that prompt engineers to observe the condition of cable and connections. This operating experience demonstrates that Seabrook Station monitors the condition of accessible cables and connections.

The above operating experience demonstrates Seabrook Station's consideration of industry operating experience, its involvement in industry activities directly related to the subject program, and that plant processes are being implemented to manage the aging of accessible cables and connections.

Conclusion

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.33 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 EQ REQUIREMENTS USED IN INSTRUMENTATION CIRCUITS

Program Description

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program is a new program that will manage the aging effects of reduced insulation resistance due to exposure to adverse localized environments caused by heat, radiation, or moisture in the presence of oxygen, causing increased leakage currents. This program applies to sensitive instrumentation cable and connection circuits with low-level signals in the in-scope portions of in-core neutron flux monitoring cable in the Nuclear Instrumentation System. These cables are not included in the Seabrook Station EQ Program.

This program considers the technical information and guidance provided in the following:

a. NUREG/CR-5643, *"Insights Gained From Aging Research"*

b. IEEE Std. P1205, *"IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations"*

c. SAND96-0344, *"Aging Management Guidelines for Commercial Nuclear Power Plants – Electrical Cable and Terminations"*

d. EPRI TR-109619, *"Guideline for the Management of Adverse Localized Equipment Environments"*

These in-scope in-core neutron flux monitoring cables and connections in the Nuclear Instrumentation System are routed inside containment and potentially exposed to moisture, radiation, and high temperatures. The high voltage low-level signal instrumentation circuits from the Radiation Monitoring System are not included in this program. These cables are included in the Seabrook Station EQ program.

The Seabrook Station program contains no actions to prevent or mitigate aging degradation.

The Seabrook Station program specifies insulation resistance tests to be performed on in-scope cable to determine the cable insulation condition. Insulation resistance testing of cable systems is a proven method for detecting deterioration of the insulation system. The frequency of the tests on these cables will be based on engineering evaluation, but the test frequency will be at least once every ten years. The first test will be completed before entering the period of extended operation. The program will develop acceptable insulation resistance values. The acceptable insulation resistance values for the test will provide reasonable assurance that the cable will perform its intended function.

Unacceptable test results are entered into the Corrective Action Program. The program's corrective actions component requires that an engineering evaluation to be performed when the test acceptance criteria are not met in order to ensure that the intended functions of the electrical cable system can be maintained consistent with the current licensing basis. The evaluation considers the significance of the test results, the operability of the component, the reportability of the event, the extent of the concern, the potential root causes for not meeting the test acceptance criteria, the corrective actions required, and likelihood of recurrence.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.E2.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Plant-specific and industry wide operating experience was considered in the development of this program. The review of plant-specific and industry-wide operating experience ensures that the corresponding NUREG-1801, Chapter XI.E2 Program will be an effective Aging Management Program for the period of extended operation.

1. Industry operating experience that forms the basis for this program is included in the operating experience element of the corresponding NUREG-1801, Chapter XI Program. Industry operating experience noted in NUREG-1801 has shown that exposure of electrical cables to adverse localized environments caused by heat, radiation, or moisture can result in

reduced insulation resistance. Reduced insulation resistance causes an increase in leakage currents between conductors and from individual conductors to ground. A reduction in insulation resistance is a concern for circuits with sensitive high voltage, low-level signals such as nuclear instrumentation circuits since it may contribute to signal inaccuracies. Insulation resistance testing is an acceptable method for determining the cables condition. Seabrook Station considered this industry operating experience in the development of the program.

2. Plant specific operating experience was reviewed. Insulation resistance tests have been performed on the in-scope sensitive instrumentation cable and connections.

   In 2008, testing was performed on all in-core neutron flux monitoring cables and connections. The test results documented a less than expected insulation resistance reading between the inner and outer shield. The low insulation resistance reading was attributed to the connector design. The design issue was resolved and retesting found the cable and connection to be acceptable. Although this example is not representative of age related degradation, it does demonstrate that the test method is an acceptable for identifying degraded conditions.

The above plant specific operating experience shows that insulation resistance testing is an effective method to determine the acceptability of cables and connections used in nuclear instrumentation circuits

Conclusion

The Seabrook Station Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.34 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 EQ REQUIREMENTS

Program Description

The Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program that will manage the aging effects of localized damage and breakdown of insulation leading to electrical failure of inaccessible medium voltage cables due to adverse localized environments caused by exposure to significant moisture and voltage.

Seabrook Station defines an adverse localized environment for medium-voltage cables as exposure to moisture for more than a few days while energized at the system voltage for more than 25 percent of the time.

The Seabrook Station program includes periodic inspections of manholes containing in-scope medium voltage cables. The inspection focuses on water collection in cable manholes, and draining water, as needed. The frequency of manhole inspections for accumulated water and subsequent pumping will be based on inspection results. The objective of the inspections is to keep the cables from becoming submerged thereby minimizing their exposure to significant moisture. To meet this objective, adjustments in inspection frequency may be required. The maximum time between inspections will be no more than two years. The first inspections will be completed prior to entering the period of extended operation.

In addition to periodic manhole inspections, in-scope, medium-voltage cables exposed to significant moisture and energized at the system voltage for more that 25 percent of the time are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test, and is a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, "*Effects of Moisture on the Life of Power Plant Cables*" or other testing that is state-of-the-art at the time the test is performed. Cable testing will be performed prior to entering the period of extended operation and at least every 10 years thereafter.

Development of this program considers the technical information and guidance provided in the following:

a. NUREG/CR-5643, *"Insights Gained From Aging Research"*

b. IEEE Std. P1205, *"IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations"*

c. SAND96-0344, *"Aging Management Guidelines for Commercial Nuclear Power Plants – Electrical Cable and Terminations"*

d. EPRI TR-109619, *"Guideline for the Management of Adverse Localized Equipment Environments"*

Seabrook Station defines significant moisture as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Seabrook Station considers periodic exposures to moisture that last less than a few days (i.e., normal rain and drain) as not being significant. Significant voltage exposure is defined as being subjected to system voltage for more than twenty-five percent of the time.

The Seabrook Station program includes periodic actions taken to prevent cables from being exposed to significant moisture, such as inspecting for water collection (and draining if needed) in manholes that contain in-scope inaccessible medium-voltage cables.

The Seabrook Station program acceptance criteria for the electrical cable test is defined by the specific type of test performed and the specific cable tested. If water is found in manholes, the water will be drained and the inspection frequency will be increased.

Unacceptable tests or inspections will be entered into the Corrective Action Program. The corrective action will include an engineering evaluation when the cable testing test acceptance criteria are not met to determine the acceptability of the cable to perform its intended function consistent with the current licensing basis. The evaluation will also consider the significance of the test results, the operability of the component, the reportability of the event, the extent of the concern, the potential root causes for not meeting the test acceptance criteria, the corrective actions required, and the likelihood of recurrence. The corrective action process will include a determination as to whether the same condition or situation is applicable to other inaccessible, in-scope, medium-voltage cables.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.E3.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Plant-specific and industry wide operating experience was considered in the development of this program. The review of plant-specific and industry-wide operating experience ensures that the corresponding NUREG-1801, Chapter XI.E3 Program will be an effective Aging Management Program for the period of extended operation.

1. The Seabrook Station program considered NUREG-1801 as part of the operating experience review. NUREG-1801 compiled the industry operating experience for inaccessible medium voltage cables. This information is current through the September 2005 issue date of the NUREG. This demonstrates that Seabrook Station considered industry operating experience in the formation of this aging management program.

2. Seabrook Station reviewed NRC Generic Letter 2007-01, "*Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients*". The Generic Letter informed licensees of failure of certain power cables can affect the functionality of multiple accident mitigation systems or cause plant transients. As part of the Generic Letter, the NRC provided examples of medium voltage cable failures at other utilities. In response to Generic Letter 2007-01, Seabrook Station described periodic testing of representative low voltage cables, testing of medium voltage cables and periodic inspections of manholes. The response concluded that no failures have occurred in power cables in the scope of Maintenance Rule. This operating experience demonstrates Seabrook's involvement in regulatory activities relative to inaccessible cables.

3. Seabrook Station performed reviews of plant specific operating experience. The review focused on test data of in-scope cables and manhole inspections.

   In 1994, a commitment was made to inspect 10 percent of the safety related manholes every five years. This commitment is reiterated in the Seabrook Station response to Generic Letter 2007-01.

   In 2009, a fleet procedure was issued which provided a dewatering strategy for electrical cables. The strategy is that all medium voltage cables important to generation and nuclear safety are to be maintained in a dry (not submerged) condition. The fleet procedure states that the inspection frequency should be based on operating experience that has demonstrated successful methods for keeping the cable dry. Seabrook Station has issued guidelines to implement the fleet procedure and has begun the process of complying with the fleet procedure.

   Seabrook Station performed inspections in late 2009 and early 2010 of all safety related manholes containing medium voltage cables. Water was removed from the manholes. The inspection frequency was increased as required to prevent the medium voltage cables from becoming submerged.

   Results of tests performed in 2008 were reviewed. All in-scope cables met the acceptance criteria of the test performed.

This operating experience demonstrates that Seabrook Station is proactively managing the water levels in manholes containing safety related medium voltages cables and testing medium voltage cables.

The above operating experience demonstrates that Seabrook Station considered industry operating experience while preparing this program, and participated in regulatory activities related to inaccessible medium voltage cables. The operating experience also demonstrates that Seabrook Station is proactive in managing the aging of inaccessible medium voltage safety related cables.

Conclusion

The Seabrook Station Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.35 METAL ENCLOSED BUS

Program Description

The Metal Enclosed Bus (MEB) Program is a new program that will manage the following aging effects of in-scope metal enclosed busses:

a. Loosening of bolted connections due to thermal cycling and ohmic heating

b. Hardening and loss of strength due to elastomer degradation

c. Loss of material due to general corrosion

d. Embrittlement, cracking, melting, swelling, or discoloration due to overheating or aging degradation

This new program will be implemented prior to entering the period of extended operation and at least once every 10 years thereafter.

The in-scope MEB's are the non-safety related 4160V non-segregated bus ducts 1-ED-BD-1 thru -4, the non-safety related 13800V non-segregated bus ducts 1-ED-BD-5 thru -8, the safety related 4160V non-segregated bus ducts 1-EDE-BD-9 thru -12 and the non-safety related 25kV isolated phase bus duct 1-ED-BD-13.

Aging management of the exterior housing and elastomers of the in-scope MEB's is included in the Structures Monitoring Program. The inspection frequency and acceptance criteria for these components will be defined by the Structures Monitoring Program.

The internal portions of the in-scope metal enclosed bus enclosures will be visually inspected for aging degradation of insulating material and 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 isolated phase bus conductor is not insulated. The internal bus supports will be visually inspected for structural integrity and signs of cracks. The accessible bus sections will be inspected for loose connections using thermography from outside the metal enclosed bus while the bus is energized.

The program requires that bolted connections be below the maximum allowed temperature for the application, and free of unacceptable visual defects.

Unacceptable thermography heat signatures or unacceptable visual indications are entered into the Corrective Action Program.

The corrective action process will perform further investigations and evaluations when inspections do not meet the acceptance criteria. Corrective actions applied to inspections that do not meet the acceptance criteria may include but are not limited to cleaning, drying, increased inspection frequency, replacement, or repair of the affected MEB components. If an unacceptable condition or situation is identified, a determination is made as to whether the same condition or situation is applicable to other accessible or inaccessible MEBs.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.E4.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Plant-specific and industry wide operating experience was considered in the development of this program. The review of plant-specific and industry-wide operating experience ensures that the corresponding NUREG-1801, Chapter XI.E4 Program will be an effective Aging Management Program for the period of extended operation.

1. Industry operating experience that forms the basis for the Seabrook Station Program is included in the operating experience element of the corresponding NUREG-1801, Chapter XI Program. Industry operating experience noted in NUREG-1801 has shown that failures have occurred on MEBs caused by cracked insulation and moisture or debris buildup internal to the MEB. Industry operating experience noted in NUREG-1801 has also shown that MEB exposed to appreciable ohmic or ambient heating during operation may experience loosening of bolted connections related to the repeated cycling of connected loads or of the ambient temperature environment. This condition can occur in heavily loaded circuits (i.e., those exposed to appreciable ohmic heating or ambient heating) that are routinely cycled. This operating experience demonstrates that Seabrook Station considered industry operating experience in the development of this program.

2. INPO issued a Special Event Report, SER 5-09, "6.9-kV Nonsegregated Bus Failure and Complicated Scram." The event report documents the catastrophic failure of a 6.9-kV nonsegregated bus. The cause of the event was attributed to the overheating of the center bus bar at the flex connection. This operating experience demonstrates that Seabrook Station considered industry operating experience in the development of this program.

3. Seabrook Station performs periodic visual inspections and infrared thermography tests on all in-scope non-segregated bus and the isolated phase bus.

   In 2005, during the inspection of a non- segregated phase bus, white corrosion was found on a bolted connection surface near a flat washer. In addition, a green residue was noted on the surface area of the bus near the connection area. The connection was broken to facilitate a complete inspection of the connection for additional corrosion. The connection was remade and successfully tested. The same duct was noted that an expansion joint was not sealing. The deficiency was corrected. This operating experience demonstrates the effectiveness of visual inspections.

   In 2007, a condition report was issued to document the results of thermography inspections performed after power up-rate modifications. The Condition Report reports increasing temperature on the generator neutral bus conductor. The root cause analysis prescribed several remedies including design changes for the connections, increased ventilation and air flow. Subsequent thermography inspections found the bus temperatures to be within the design limits. Although this operating experience is not age related it demonstrates the effectiveness of thermography inspections.

In 2008, a condition report was issued to document an inspection of the Isolated Phase Bus. During the inspection, a black substance on the outside of the duct was discovered. The substance was determined to be elastomer deterioration. Work orders were initiated to inspect bus elastomers and replace as necessary. This operating experience demonstrates the effectiveness of visual inspections.

A review of recent inspection data for the other in-scope metal enclosed bus did not reveal any other anomalies.

4. Recent MEB thermography inspection results were reviewed. No anomalies were identified. This operating experience demonstrates that Seabrook Station is proactive by inspecting for loose connections.

The above operating experience demonstrates that Seabrook Station considered industry and plant specific operating experience in the development of this program, that visual inspection is an acceptable method in finding anomalies and that the plant is proactive by inspecting for loose connections.

Conclusion

The Seabrook Station Metal Enclosed Bus Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.36 FUSE HOLDERS

Program Description

The Fuse Holders Program is a new program that will manage the aging effects of thermal fatigue in the form of high resistance due to corrosion or oxidation of in-scope metallic clamps of fuse holders.

The Seabrook Station program, *"Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements",* will manage the aging of insulating material but not the metallic clamps of the fuse holders.

The program will perform tests on the in-scope fuse holders (metallic clamps). The test will be a proven test such as thermography, or contact resistance which detects thermal fatigue in the form of high resistance caused by corrosion or oxidation. The type test performed will be determined prior to the initial test. The first test will be completed prior to entering the period of extended operation and at least once every 10 years thereafter.

The program applies to the metallic portions of fuse holders located outside of active devices and considered susceptible to aging effects. Fuse holders inside an active device (e.g., switchgears, power supplies, power inverters, battery chargers, and circuit boards) are not within the scope of this program. The fuse holders in the scope of this program have been identified and are located in 19 fuse panels.

No actions are taken as part of this program to prevent or mitigate aging degradation.

This program inspects for high resistance due to corrosion and oxidation on the metallic clamp portion of the fuse holder.

The Seabrook Station analysis shows that the aging effects due to thermal fatigue in the form of high resistance caused by ohmic heating, thermal cycling or electrical transients, mechanical fatigue caused by frequent removal/replacement of the fuse or vibration do not require aging management.

The program will define the acceptance criteria for each specific type of test and inspection performed and the specific type of fuse holder tested. If thermography is used, a heat signature should not indicate abnormal temperatures for the application. If contact resistance test is used, the resistance value should be appropriate for the application.

Unacceptable inspection or test results will be entered into the Corrective Action Program. An engineering evaluation will be performed to ensure that the intended functions of the fuse holders can be maintained consistent with the current licensing basis. The evaluation considers the significance of the test results, the operability of the component, the reportability of the event, the extent of the concern, the potential root causes for not meeting the test acceptance criteria, the corrective action necessary, and the likelihood of recurrence.

NUREG-1801 Consistency

The program is consistent with NUREG-1801 XI.E5.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Plant-specific and industry wide operating experience was considered in the development of this program. The review of plant-specific and industry-wide operating experience ensures that the corresponding NUREG-1801, Chapter XI.E5 Program will be an effective Aging Management Program for the period of extended operation.

1. Industry operating experience that forms the basis for this program is included in the operating experience element of the corresponding NUREG-1801, Chapter XI Program. NUREG-1801 notes that loosening of fuse holders and corrosion of fuse clips are aging mechanisms that, if left unmanaged, can lead to a loss of electrical continuity function. Also, as stated in NUREG-1760, "*Aging Assessment of Safety-Related Fuses Used in Low and Medium Voltage Applications in Nuclear Power Plants*", fuse holders experience a number of age-related failures. The major concern is that failures of a deteriorated fuse holder might be induced during accident conditions since they are not subject to the environmental qualification requirements of 10 CFR 50.49. This operating experience demonstrates that Seabrook Station considered industry operating experience in the development of this program.
2. Seabrook Station routinely performs infrared thermography tests on numerous pieces of equipment including electrical connections as part of the preventive maintenance program.

   In 2008, during a routine infrared thermography test, a fuse holder was found to be 50° F hotter than similar fuses in the cabinet. The problem was diagnosed as a defective fuse holder. The documentation identified this anomaly as defective equipment and not age related. This operating experience demonstrates the effectiveness of the thermography test.

3. Seabrook Station has performed thermography or resistance tests on fuses located in the in-scope fuse panels. All recent tests were reviewed and found to be satisfactory. This operating experience demonstrates that Seabrook Station is proactive in efforts to detect heat due to increased resistance of fuse holders.

4. In 2009, members of the Seabrook Station License Renewal team performed a walkdown of the in-scope Train "B" fuse cabinets. The walkdown was performed to assess the current condition of the in-scope fuse panels. The walkdown results concluded that fuse blocks showed no signs of excessive heating, discoloration, corrosion, degradation or looseness. However, a Condition Report was written to document the presence of a residue on the fuse cabinet mounting bolts. The evaluation of

the anomaly concluded that residue on the bolts had no affect on the fuse holders. This operating experience confirms that the current condition of the in-scope fuse holders viewed during the walkdown is free of corrosion and oxidation.

Conclusion

The Seabrook Station Fuse Holders Program provides reasonable assurance that the aging effects will be adequately managed such that components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.1.37 ELECTRICAL CABLE CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 EQ REQUIREMENTS

Program Description

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new, one-time testing program that will be used to verify that the aging effect of loosened bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination corrosion and oxidation on the metallic portion of electrical cable connections does not require management.

A representative sample of cable connections within the scope of license renewal will be selected for one-time testing prior to the period of extended operation. The scope of this sampling program will consider application (medium and low voltage), circuit loading (high loading), and location (high temperature, high humidity, vibration, etc). The technical basis for the sample selection will be documented.

The specific type of test performed will be a proven test for detecting loose connections, such as thermography or contact resistance measurement, as appropriate for the application.

The program scope includes external connections terminating at active or passive devices. Wiring connections internal to an active assembly are considered a part of the active assembly and therefore not within the scope of the program. The program does not include high-voltage (>35 kV) switchyard connections. Seabrook Station cable connections covered under the EQ program are not included in the scope of this program.

No actions are taken as part of this program to prevent or mitigate aging degradation.

The Seabrook Station program will perform tests on a representative sample of electrical connections within the scope of license renewal at least once prior to the period of extended operation to confirm that there are no aging effects requiring management during the period of extended operation. The testing methods will include either thermography or contact resistance testing. The test will not remove connection insulation such as heat shrink tape, sleeving, insulating boots, etc. The program is a one-time inspection which provides additional confirmation to support industry operating experience that shows electrical connections have not experienced a high degree of failures, and that existing installation and maintenance practices are effective.

The acceptance criteria for bolted connections will meet the criteria as defined for the specific type of test performed and the specific type of cable connections tested. If thermography is used, a heat signature should not indicate abnormal temperatures for the application. If contact resistance test is used, the resistance value should be appropriate for the application.

If test acceptance criteria are not met, the results will be entered into the Corrective Action Program. The corrective action process will be used to perform an evaluation that will consider the extent of the condition, the indications of aging effect, and changes to the one-time inspection program. Corrective actions may include, but are not limited to sample expansion, increased inspection frequency, and replacement or repair of the affected cable connection components.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 XI.E6 as modified by LR-ISG-2007-02.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Plant-specific and industry wide operating experience was considered in the development of this program. The review of plant-specific and industry-wide operating experience ensures that the one-time inspection corresponding to NUREG-1801, Chapter XI.E6 Program will confirm the absence or presence of age-related degradation of cable connections caused thermal cycling, ohmic heating, corrosion and oxidation.

1. Seabrook Station routinely performs infrared thermography tests on numerous pieces of equipment, including electrical connections, as part of the preventive maintenance program.

   In 2002, during an infrared thermography inspection of a 480 volt circuit breaker, a hot connection was found. The connection was approximately 150° F hotter than similar connections. Seabrook Station procedures required that the connection be corrected within one week. Infrared thermography was used to monitor the connection on a daily basis until corrective action could be taken to correct the hot connection. This operating experience shows that the maintenance practices at Seabrook Station are effective in identifying electrical connection anomalies prior to loss of intended function.

   In 2005, an infrared thermography inspection identified heating on three connections in a control panel. The connections were 30°F to 50°F higher than expected. Seabrook Station procedures require that this condition be corrected in 12 weeks. The hot connections were repaired. The connections were found to be tight and the hot spot was attributed to defective connectors. This operating experience shows that the maintenance practices at Seabrook Station are effective in identifying electrical connection anomalies prior to loss of intended function.

The above examples of operating experience provides evidence that the testing method utilized by Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements will be effective in finding loose electrical connections prior to failure. Additionally it shows that Seabrook Station's experience is in alignment with the industry in that electrical connections have not experienced a high degree of failures.

Conclusion

The Seabrook Station Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.2 PLANT SPECIFIC AGING MANAGEMENT PROGRAMS

B.2.2.1 345 kV SF_6 BUS

Program Description

The Seabrook Station 345kV SF_6 Bus Program is a new plant-specific program that will manage the following aging effects on the 345kV SF_6 Bus:

a. Loss of pressure boundary due to elastomer degradation

b. Loss of material due to pitting, crevice and galvanic corrosion

c. Loss of function due to unacceptable air, moisture or sulfur dioxide (SO_2) levels

Sulfur Hexafluoride (SF_6) is an inert gas used to insulate the bus conductor.

The program will inspect for corrosion on the exterior of the bus duct housing, test for leaks at elastomers and periodically test gas samples to determine air, moisture and SO_2 levels.

Program Elements

The following provides the results of the evaluation of each program element against the 10 elements described in Appendix A of NUREG-1800 Rev. 1, *"Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants"*.

Element 1 - Scope of Program

The Seabrook Station program is a new plant specific program that applies to SF_6 bus within the scope of license renewal.

The in-scope Seabrook Station SF_6 bus segments are those included in the recovery path for a Station Black Out event. Two possible recovery paths are identified. The components are shown on Figure 2.5-1.

The first path includes the SF_6 bus from 345 kV Power Circuit Breakers 11 and 163 to the Generator Step Up transformer. This path continues from the Generator Step Up transformer to Unit Auxiliary Transformers via the Isolated Phase Bus.

The second path includes the SF_6 bus from 345 kV Power Circuit Breakers 52 and 695 to the Reserve Auxiliary Transformers.

The purpose of the program is to maintain the pressure boundary formed by the bus exterior metal housing and elastomers. The program also monitors critical SF_6 parameters such as air, moisture and SO_2 levels.

The integrity of the elastomers will be routinely monitored by performing leak tests as part of the SF_6 Bus Program.

Element 2 - Preventive Actions

The Seabrook Station program performs tests and inspections. No actions are taken as part of this program to prevent or mitigate aging degradation.

Element 3 - Parameters Monitored/Inspected

Critical parameters of the SF_6 bus system are mechanical integrity of the system to maintain a pressure boundary, maintain acceptable air, moisture and SO_2 levels.

The Seabrook Station program maintains the integrity of the SF_6 pressure boundary. The program includes pressure monitoring of the SF_6 gas to insure that adequate insulating properties are maintained.

The Seabrook Station program performs periodic tests on samples of the SF_6 gas. These tests determine the air, moisture and SO_2 levels. The SO_2 measurements provide an indication of arcing internal to the bus.

The Seabrook Station program performs inspections for loss of materials on the exterior surfaces of the duct.

Element 4 - Detection of Aging Effects

The Seabrook Station program tests samples of the SF_6 gas to determine if the insulating properties are adequate. These tests are focused on air, moisture and SO_2 levels. The SO_2 measurements provide an indication of arcing internal to the bus. The gas is sampled prior to entering the period of extended operation and at least once every six months thereafter.

This Seabrook Station program maintains the pressure boundary by monitoring the pressure of SF_6 gas and inspecting for leaks. The system SF_6 bus is inspected for leaks prior to entering the period of extended operation and at least once every six months thereafter.

This Seabrook Station program performs visual inspections on the exterior surfaces of the duct prior to entering the period of extended operation and at least once every six months thereafter.

Element 5 - Monitoring and Trending

The Seabrook Station program does include trending actions of the SF_6 properties. Trending provides additional data which can be analyzed to determine the rate of change in the measured parameter.

Element 6 - Acceptance Criteria

The Seabrook Station program performs leak tests, tests the quality of SF_6 gas, and inspects for loss of material.

The Seabrook Station program maintains the pressure boundary by inspecting for leaks and monitoring SF_6 gas pressure. The minimum acceptable pressure value is sufficient to provide adequate insulation between the conductor and the exterior housing. The SO_2 measurements of the SF_6 gas provide an indication of partial discharge occurring internal to the bus. Any indication of the presence of SO_2 will be evaluated by Engineering. The evaluation will provide any corrective actions required.

A dew point check is used to determine the moisture content of the SF_6 gas. The maximum allowable dew point measurement is below the dew point value that would lead to breakdown of the insulation.

A purity check is used to determine the air content of the SF_6 gas. The maximum allowable air content is below the value that would lead to breakdown of the insulation.

The presence of pitting, crevice and galvanic corrosion will be detected by visual inspections on the exterior surfaces of the duct. Engineering evaluations will be performed if corrosion is found on the SF_6 duct. The evaluation will include a determination of the ability of the remaining wall thickness to maintain the required pressure boundary.

Element 7 - Corrective Actions

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 7 Corrective Actions.

Element 8 - Confirmation Process

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 8 Confirmation Process.

Element 9 - Administrative Controls

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 9 Administrative Controls.

Element 10 - Operating Experience

Seabrook Station routinely performs monitoring and test activities for various parameters of the SF_6 bus. The inspections and tests are performed as part of the preventive maintenance activities. Results that are not acceptable are documented in the Corrective Action Program.

1. Seabrook Station relied on a review of the Corrective Action Program database to provide the basis of this review.

   In 2001 EPRI conducted SF_6 leak inspections at Seabrook Station. This operating experience demonstrates Seabrook's involvement in the industry to increase the reliability of the SF_6 switchyard.

   In 2008 an increase in the level of SO_2 was found in a sample of the SF_6 gas. An engineering evaluation attributed the increase to thermal cycling or partial discharge which occurs with normal switch operation. The SF_6 gas was filtered. Follow up tests were within acceptable limits. This operating experience demonstrates the ability of the Station to detect and analyze anomalies prior to loss of intended function.

2. Seabrook Station is performing extensive modifications to increase the reliability of the SF_6 switchyard. The first stages of the modifications were completed in 2009. Seabrook Station has additional long term plans to perform additional modifications to increase the reliability of the SF_6 switchyard. These modifications include realignment of high voltage breaker scheme, installation of new breakers, and bus sections. This operating experience demonstrates Seabrook Station's effort to upgrade the reliability of the switchyard.

3. SF_6 emissions are not currently subject to federal regulations, but are regulated under New Hampshire Air Toxic rules and subject to emission inventory reporting requirements under Seabrook Station's Title V Permit. Seabrook Station has partnered with Environmental Protection Agency (EPA) voluntary SF_6 Emission Reduction Partnership to reduce SF_6 emissions.

   Since 1999 Seabrook Station has submitted annual reports to the EPA to provide updates of the previous year's results. To meet the EPA goals aggressive maintenance and leak detection activities aimed at reducing SF_6 emissions are performed. In addition to environmental stewardship, maintaining low SF_6 leakage enhances the ability of the SF_6 bus to perform its intended function. This operating experience demonstrates that maintenance activities are effective in maintaining a safe environment and reliable switchyard.

The above operating experience demonstrates efforts to improve reliability of the SF_6 switchyard, involvement with industry, and ability to detect gas deficiencies.

Exceptions to NUREG-1800

None

Enhancements

None

Conclusion

The Seabrook Station 345kV SF_6 Bus Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.2.2 BORAL MONITORING

Program Description

The Seabrook Station Boral Monitoring Program is an existing, plant specific program that manages the aging effects of reduction of neutron absorbing capacity due to Boral degradation and changes in dimensions and loss of material due to general corrosion of the Boral neutron absorbing material in the Spent Fuel storage racks. The program assures the Boral neutron absorbers in the Spent Fuel racks maintain the validity of the criticality analysis in support of the rack design. The program relies on representative coupon samples mounted in a coupon "*train*" located in the Spent Fuel Pool to monitor performance of the absorber material without disrupting the integrity of the storage system. The program is performed on a fuel cycle basis so that these coupons receive the maximum available radiation exposure from each core off-load to the Spent Fuel Pool. The coupons are examined and evaluated prior to the next core off-load after most of the available coupon exposure has been realized. This typically occurs 2 to 4 months prior to the next refueling outage. Coupon samples are removed from the Spent Fuel Pool on a prescribed schedule and physical, chemical and neutronic absorptive properties are measured. From these data, the physical condition and neutron-absorbing capacity of the Boral in the storage cells are assessed. The coupons are placed back into the coupon train after inspection and testing. The train is returned to the Spent Fuel Pool 1 to 2 months prior to the next core off-load to support proper rehydration and acclimation of the coupons to the Spent Fuel Pool conditions. Location of the coupon train in the Spent Fuel

Pool and the loading pattern for spent fuel in the upcoming outage are determined at this time in order to optimize exposure to the Boral coupons.

Reduction of neutron-absorbing capacity, change in dimensions, and loss of material due to the effects of the Spent Fuel Pool environment are aging effects requiring management for Boral exposed to a treated borated water environment as described in Draft LR-ISG-2009-01, *"Staff Guidance Regarding Plant-Specific Aging Management Review and Aging Management Program for Neutron-Absorbing Material in Spent Fuel Pools"*. Because NUREG-1801, Section XI does not contain an Aging Management Program for monitoring the aging effects on Boral, the guidance provided in Draft LR-ISG-2009-01 was used to evaluate the Seabrook Station Boral Monitoring Program. Seabrook Station has reviewed the final LR-ISG-2009-01, "*Aging Management of Spent Fuel Pool Neutron-Absorbing Materials Other than Boraflex*", dated May 4, 2010 and determined that the Seabrook Station Boral Monitoring Program Meets the requirements of the final guidance.

The Boral Monitoring Program is used to manage the aging effect of reduction of neutron-absorbing capacity. Inspection of the surveillance coupons for evidence of change in dimensions and loss of material due to the effects of the Spent Fuel Pool environment is included in the Boral Monitoring Program and serves as the indicator of similar degradation of the actual Boral sheets in the Spent Fuel racks.

Boral sheets consist of a core of uniformly distributed boron carbide in an alloy 1100 aluminum matrix with a thin aluminum clad on both sides. The core "*cermet*" (ceramic-metallic) is slightly porous and exposed to the wet pool environment along the sheared edges of each sheet.

Two degradation mechanisms have been observed and identified in the Seabrook Station Boral Monitoring Program. The first mechanism indicates blisters in the Boral clad formed as the clad separates at the clad-cermet interface under the influence of internal gas pressure generated within the cermet porosity under Spent Fuel Pool conditions. A Part 21 (2003-0022-00) notification was initiated by Seabrook Station on discovery of these blisters. The second observed degradation process involves aluminum corrosion within the Boral clad and core matrix. Corrosion through the clad and into the cermet matrix frees boron carbide particulate to be eroded away from the racks by pool water.

The Seabrook Station Boral Monitoring Program will continue to monitor the neutron absorbing capacity of the Boral sheets in the Spent Fuel Pool through the period of extended operation. Should this program show, through evaluation of the Boral coupons, that this capacity has degraded such that the subcriticality margin in the pool becomes challenged, appropriate evaluation and actions will be determined in accordance with the Seabrook Station Corrective Action Program.

Program Elements

The following provides the results of the evaluation of each program element against the 10 elements described in Appendix A of NUREG-1800 Rev. 1, *"Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants"*.

Element 1 - Scope of Program

The Seabrook Station Spent Fuel Pool is divided into two regions with twelve free standing and self-supporting racks. Region 1 has six racks with Boral as the neutron absorber that allow space for 576 fuel assemblies and Region 2 has six racks with Boraflex that allow space for 660 fuel assemblies. The Boraflex utilized in the Region 2 racks is not credited in the criticality analyses and is therefore not within the scope of License Renewal. The scope of this Seabrook Station Boral Monitoring Program is the management of the reduction of neutron-absorbing capacity of the Boral sheets in Region 1. This is accomplished by monitoring neutron-absorbing capacity, inspecting for changes in dimensions and inspecting for loss of material due to general corrosion caused by the effects of the Spent Fuel Pool environment on representative Boral coupons.

Element 2 - Preventive Actions

This is a condition monitoring and inspection program and therefore there are no preventive actions required.

Element 3 - Parameters Monitored/Inspected

Seabrook Station utilizes standard Boral coupons of the same design as, and traceable to, the specific Boral heat lot material used in the fabrication of the Spent Fuel Racks. The standard coupons are placed in the Spent Fuel Pool for monitoring of the aging effects. Control coupons were supplied in addition to standard coupons to benchmark coupon initial conditions, monitor possible uncontrolled changes in Boral material that are unrelated to the Spent Fuel Pool conditions, and to demonstrate comparisons between different examination techniques and service contractors. The control coupons are kept out of the Spent Fuel Pool unless needed to replace a standard coupon that has become unavailable.

The program monitors changes in the following physical properties of the Boral material by visual examination of the Boral coupons by Seabrook Station personnel. Selected control coupons are used for comparison.

a. Blistering, pitting, cracks, corrosion and spalling, loss of material, and other damage or condition

b. Dimensional measurements (length, width and thickness)

Two or more Boral coupons are selected each refueling outage for examination by an outside contractor. Neutron attenuation, neutron radiography examination and other nondestructive examinations are performed. The Boral monitoring cycle engineering evaluation provides guidance in determining the specific examinations to be performed during a given monitoring cycle.

A control coupon with traceability to the Boral sheets installed in the Spent Fuel Pool racks is also examined by neutron attenuation and radiography for comparison.

Contractor examinations support the determination of boron-10 (B^{10}) areal density and the boron distribution within the Boral coupons. This information is used to evaluate any reduction of neutron-absorbing capacity noted in the Boral coupons. These examinations also provide information related to the size and volume of blisters on the coupons. Boral blisters can result in small but quantifiable reactivity effects due to moderator or dissolved boron displacement. This information is used to determine the overall effect of accrued blistering of the Boral sheet surfaces on the Spent Fuel Pool criticality analysis.

<u>Element 4 - Detection of Aging Effects</u>

The program monitors coupon samples located in the Spent Fuel Pool to determine the condition of the neutron absorber material without disrupting the integrity of the Spent Fuel storage system. The program measures certain physical and chemical properties of these sample coupons each refueling outage as described above. From these data, the stability and integrity of the Boral in the Spent Fuel racks are assessed relative to any reduction in the neutron-absorbing capacity of the Boral sheets and to any degradation of the sheets as a result of corrosion or blistering.

The Seabrook Station Boral Monitoring Program maintains the coupon train within the Spent Fuel Pool positioned such that the coupons experience the same conditions as the Boral panels built into the actual fuel racks. The coupons are mounted in stainless steel jackets and stainless steel coupon train mimicking the construction of the fuel racks. This realism in the program is designed to recreate the Spent Fuel Pool environment for known effects and potential effects that may be unknown at this time. Early Boral coupon programs in the industry did not recognize that the radiation and electrolytic effects, water temperature, thermodynamic response of the coupon in its jacket, gamma heating of the coupon and jacket as well as radiolytic chemical species generated in the racks all contribute to the reactions affecting the Boral material.

Element 5 - Monitoring and Trending

Neutron attenuation tests are trended to ensure that degradation does not challenge the assumptions within the Spent Fuel Pool Criticality Analysis of record. Observable loss in neutron attenuation ability, if any, is projected to determine when neutron attenuation may fall below acceptance criteria. Size and weight measurements determine the extent of shrinkage or loss of material. These data are trended for indications of degradation. Blister shape and size are recorded and trended to determine whether new blisters are forming, the rate of growth of existing blisters, and the rate of increase in blister thickness. By the Seabrook Station design, all blister growth is directed into the flux trap space between fuel cells and not into the cell. This design, combined with the thickness of the cell box wall (90 mils), precludes blister impingement on or interference with the fuel assembly.

Element 6 - Acceptance Criteria

Acceptance criteria for the following properties are applied to each exposed Standard Boral coupon inspected. Failure to meet an acceptance criterion is addressed by subsequent engineering evaluations.

a. *Voided Blister Displacement* - The total blister void volume for all blisters present on both sides of a coupon will be less than a 45 mil uniform void over the area of the coupon. The rate of change in blister displacement provides indication of availability of sufficient margin to avoid exceeding the 45 mil uniform void prior to the next Boral coupon examination.

b. *Boron Carbide Loss* - B^{10} areal density measured by thermal neutron attenuation will be greater than 0.02 gm/cm^2 as specified within the criticality analysis and material specification. The rate of change in boron carbide loss provides indication of availability of sufficient margin to maintain the 0.02 gm/cm^2 B^{10} areal density beyond the next Boral coupon examination.

c. *Boron Carbide Redistribution* - Boron carbide distribution will be uniform as observed by thermal neutron radiography. Thinned or depleted areas will satisfy the criterion for boron carbide loss discussed above.

The purpose of the Seabrook Station Boral Monitoring Program is to ensure that degradation does not challenge the design bases and assumptions within the Spent Fuel Pool Criticality Analysis of record. The design of the Region 1 Spent Fuel racks containing Boral as a neutron absorbing material assures a $K_{eff} < 0.95$ (5% subcriticality margin).

Element 7 - Corrective Actions

A set of remedial action recommendations is prepared as required to maintain the acceptable Boral function within the Spent Fuel Pool. These remedial action recommendations are prescribed based on current Boral coupon inspections. Specific recommendations for the selection of coupons for examination and inspection during the next monitoring cycle are specified.

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 7 Corrective Actions.

Element 8 - Confirmation Process

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 8 Confirmation Process.

Element 9 - Administrative Controls

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 9 Administrative Controls.

Element 10 - Operating Experience

1. During planned work involving an inspection of the Spent Fuel Pool Boral coupon tree in 2003, an unexpected blistering of the Boral material was identified when one of the Boral coupons was examined.

   The condition report evaluation concluded that the effect on the current Spent Fuel Pool criticality analysis was insignificant and the current blistered condition was acceptable as is. The evaluation stated that the degree of Boral blistering was expected to increase with repeated exposure to gamma energies present during offload; as such a Boral-monitoring program was established to evaluate future changes in the Boral material. Since the Boral monitoring program would not gather any additional data on the blistering events until after the next core offload, a water reduction in the flux trap equal to 90 mils was analyzed and applied to the revised criticality analyses to formally accommodate any increased blistering at offload. The revised type determination curves are conservative to the existing curves at all points, and were implemented prior to core offload. The type determination curves with the 90 mil allowance were included to accommodate any future blistering. This allowance is used as an acceptance criterion for the Boral monitoring program. Other acceptance criteria will include the $Boron^{10}$ areal density.

2. As of January 2003, a Boral Monitoring Program had not yet been formally established following implementation of the engineering change to incorporate Boral instead of Boraflex in the second set of fuel racks. Although no commitment had been made to implement such a program, Seabrook Station opted to establish a Boral coupon monitoring program as a good practice.

3. During the Cycle 10 monitoring program (Spring of 2005), aluminum cladding oxidation and spalling was observed on Boral coupons. Photos of these coupons taken in the previous monitoring cycle were reviewed and showed oxidation but no evidence of spalling. The progression and effect of this oxidation and spalling was evaluated and predicted to remain within the program acceptance criteria through the next coupon examination in Cycle 11, when the material would be re-evaluated.

   The Boral oxidation and spalling condition was described and posted with INPO as operating experience on August 26, 2005.

   The Cycle 11 examinations (Fall of 2006) indicated continued aluminum cladding oxidation on most coupons. The potential degradation of neutron absorbing capacity due to continued, and eventually through-wall, oxidation and spalling was evaluated by observing previously dissected blisters on special coupon A131. Blisters on this coupon had been intentionally dissected to investigate the effect on the Boral should a blistered area break through. By dissecting the blisters, the cermet compound was now exposed directly to the Spent Fuel Pool water. The altered coupon A131 with dissected blisters had been exposed to the Spent Fuel Pool conditions for approximately 3 years, and was then indicating measurable change in B^{10} areal density in the bare cermet.

   The results of the Cycle 11 examinations indicated continued aluminum cladding oxidation. The Boral coupons did, however, remain well within the areal density specification. The change in B^{10} areal density was just above the lower limit of detection by visual examination. The corrosion process appeared to be proceeding very slowly.

   The potential for measurable B^{10} loss in the unaltered coupons was reasonably expected within the next few cycles. Therefore long term B^{10} areal density monitoring, via neutron attenuation, was also implemented to ensure conformance to Boral specifications.

These operating experience items illustrate the effectiveness of the Seabrook Station Boral Monitoring Program in identifying and addressing issues that may impact the neutron absorbing capacity of the Boral materials. Aging mechanisms of reduction of neutron absorbing capacity and loss of material are adequately managed through the Seabrook Station Boral Monitoring Program as evidenced by this type of operating experience.

Exceptions to NUREG-1800

None

Enhancements

None

Conclusion

The Seabrook Station Aging Management Program for Boral Monitoring provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.2.3 NICKEL-ALLOY NOZZLES AND PENETRATIONS

Program Description

The Nickel-Alloy Nozzles and Penetrations Program is an existing plant specific program that manages the aging effect of cracking due to primary water stress corrosion cracking (PWSCC) of nickel based alloy pressure boundary and structural components exposed to reactor coolant.

Program Elements

The following provides the results of the evaluation of each program element against the 10 elements described in Appendix A of NUREG-1800 Rev. 1, *"Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants".*

Element 1 - Scope of Program

The Seabrook Station Nickel-Alloy Nozzles and Penetrations Program is described in the Seabrook Station Reference Manual – RCS Materials Degradation Management Reference.

The scope of the program includes;

a. Pressurizer Nozzles

b. Steam Generator Channel Head Drain Tube and Welds

c. Reactor Vessel Core Support Pad/Lug, and Clevis Inserts

d. Reactor Vessel Hot Leg Nozzles

e. Reactor Vessel Cold Leg Nozzles

f. Reactor Vessel Bottom Mounted Instrumentation Penetrations

The program does not include Steam Generator tubes or secondary side components (included in the Steam Generator Tube Integrity Program, B.2.1.10), Reactor Vessel Internals (included in the PWR Vessel Internals Program, B.2.1.7), or control rod drive mechanism nozzles and reactor head vent nozzle (included in the Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program, B.2.1.5).

The program is based upon the industry guidance provided in EPRI MRP-126, *"Materials Reliability Program: Generic Guidance for Alloy 600 Management"*, NEI 03-08, *"Guideline for the Management of Materials Issues"*, EPRI MRP-139 Rev 1, *"Materials Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guideline",* and ASME Section XI including Code Case N-722, *"Additional Examinations for PWR Pressure Retaining Welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials, Division 1"* as approved for incorporation under 10CFR 50.55a with conditions in accordance with the requirements in paragraphs (g)(6)(ii)(E).

The Seabrook Station Nickel Alloy Nozzles and Penetrations Program complies with applicable NRC Orders and implements applicable NRC Bulletins, Generic Letters and staff-accepted industry guidelines.

Element 2 - Preventive Actions

The Seabrook Station Nickel-Alloy Nozzles and Penetrations Program considers various mitigative and repair options to ensure that nickel-alloy components continue to perform their intended functions during the period of extended operation. Some of the currently available mitigation techniques include mechanical stress improvement, induction heat stress improvement, weld overlay, mechanical nozzle seal assembly, zinc injection, abrasive water jet, nickel plating or replacement with Alloy 690/52/152 components.

Most mitigative actions implemented by the industry since the mid-1990s have utilized primary water stress corrosion cracking resistant Alloy 690/52/152 materials.

Additional preventive measures to mitigate primary water stress corrosion cracking are in accordance with the Seabrook Station Water Chemistry

Program (B.2.1.2). The Water Chemistry Program manages aging effects by controlling concentrations of known detrimental chemical species such as chlorides, fluorides, sulfates and dissolved oxygen below the levels known to cause degradation. The program includes specifications for chemical species, sampling and analysis frequencies and corrective actions for control of water chemistry. This program conforms to the EPRI "*Pressurized Water Reactor Primary Water Chemistry Guidelines.* "

Element 3 - Parameters Monitored/Inspected

The Seabrook Station Nickel-Alloy Nozzles and Penetrations Program incorporates the inspection schedules and frequencies for the nickel-alloy components in accordance with the Seabrook ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and, where applicable, ASME Code Case N-722, subject to the conditions specified in 10 CFR 50.55a(g)(6)(ii)(E).

The program administers component evaluations, examination methods, scheduling, and site documentation as required to comply with regulatory, code or industry commitments related to Nickel Alloy issues.

The Seabrook Station Nickel-Alloy Nozzles and Penetrations Program monitors for cracking due to primary water stress corrosion cracking of Alloy 600/82/182 materials exposed to reactor coolant. The program performs condition monitoring examinations of the lower Reactor Vessel head surface and each bottom-mounted instrumentation tube penetration. These examinations monitor for through-wall cracks that may exist in the nozzles or their associated partial penetration J-groove welds. For other in-scope pressure boundary components, the program monitors for evidence of Reactor Coolant leakage which may manifest itself in the form of boric acid residues or corrosion products.

The core support pads/lugs and clevis insert are monitored for evidence of cracking. They are identified in the Seabrook Station Inservice Inspection Reference Manual as category B-N-2 Welded Core Support Structures and Interior Attachments to Reactor Vessels that are VT-3 inspected once per interval.

Element 4 - Detection of Aging Effects

The Seabrook Station Nickel-Alloy Nozzles and Penetrations Program utilizes visual and volumetric examination techniques to detect cracking in Alloy 600/82/182 materials. This Program implements the inspection of the Alloy 600/82/182 materials through the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program.

The Seabrook Station Nickel-Alloy Nozzles and Penetrations Program uses a number of inspection techniques to detect cracking due to primary water stress corrosion cracking. These include surface examinations, volumetric examinations, and bare metal visual examinations.

Bare metal visual examinations are similar to VT-2 examinations but require removal of insulation to allow direct access to the metal surface while pressurized or not pressurized. The nickel alloy components have been ranked based on susceptibility, safety, and economic consequences of degradation/failure. Where applicable, EPRI MRP-139 PWSCC susceptibility categories have been assigned to the components. This information is contained in the Seabrook Station Reference Manual - RCS Materials Degradation Management Reference and includes the categorization, description of the weldments and the examination extent and schedule.

Detection of cracking due to PWSCC is used to ensure that nickel alloy components meet required design attributes and maintain their availability to perform their intended function as designed when called upon. This program will detect age-related degradation prior to component failure. When required, repair or mitigation is used to ensure that components will meet the design requirements required to perform their intended function.

<u>Element 5 - Monitoring and Trending</u>

The Seabrook Station Nickel-Alloy Nozzles and Penetrations Program ranked the Alloy 600/82/182 locations based on four main criteria: PWSCC susceptibility (e.g., operational time and temperature), failure consequence, leakage detection margin, and radiation dose rates. Additionally, material heat susceptibility and other industry experience were considered.

The program incorporates the inspection schedules and frequencies for the nickel-alloy components in accordance with the Seabrook ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and, where applicable, ASME Code Case N-722, subject to the conditions specified in 10 CFR 50.55a(g)(6)(ii)(E).

Flaw indications detected during the required examinations are dispositioned in accordance with the Acceptance Criteria and Corrective Actions program elements discussed below.

In accordance with ASME Code Case N-722, visual examinations of highly susceptible Alloy 600/82/182 pressure retaining components are required during each refueling outage. Other Alloy 600/82/182 pressure retaining components that are considered less susceptible to primary water stress corrosion cracking are required to be examined by visual examinations every other refueling outage or once per interval.

The Alloy 600 inspections and schedule are specified in the Seabrook Station Reference Manual - RCS Materials Degradation Management Reference.

a. Pressurizer Nozzles:

   In accordance with 10 CFR 50.55a(g)(6)(ii)(E)(1), the inspection requirements of ASME Code Case N-722 do not apply to components with pressure retaining welds fabricated with Alloy 600/82/182 materials that have been mitigated by weld overlay. The six pressurizer nozzles that were mitigated with full structural weld overlays will revert to regular 10 year Inservice Inspection period following volumetric inspection in the first or second outage following installation. The near term schedule for their inspection calls for ultrasonic examinations during Refueling Outages 14 (Spring of 2011) and 17 (Fall of 2015).

b. Steam Generator Channel Head Drain Tube and Welds:

   The Steam Generator channel head (bowl drains) tube and welds are subject to a bare metal visual inspection every refueling outage.

c. Reactor Vessel Core Support Pads/Lugs, Clevis Inserts:

   The Reactor Vessel core support pad/lugs, clevis inserts are subject to visual examination of accessible welds under the Seabrook Station ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. No additional or augmented inspections are required under the Seabrook Station Nickel-Alloy Nozzles and Penetrations Program at this time.

d. Reactor Vessel Hot Leg Nozzles:

   The Reactor Vessel hot legs were ultrasonically examined during Refueling Outage 13 (Fall of 2009). Visual and Ultrasonic Thickness inspections are specified in the Seabrook Station Reference Manual - RCS Materials Degradation Management Reference. The near term inspection schedule for the hot leg nozzles for hot legs A, B, and C, calls for bare metal visual inspections during Refueling Outages 14 (Spring of 2011), 15 (Fall of 2012), 17 (Fall of 2015), and 18 (Spring of 2016) and ultrasonic examinations during Refueling Outage 16 (Spring of 2014). The nozzle for hot leg D underwent a mechanical stress improvement process during Refueling Outage 13 (Fall of 2009). Near term inspections for this nozzle call for ultrasonic inspections during Refueling Outages 14 (Spring of 2011), 16 (Spring of 2014), and 18 (Spring of 2016).

e. Reactor Vessel Cold Leg Nozzles:

   The Reactor Vessel cold legs were ultrasonically examined during Refueling Outage 13 (Fall of 2009). Future visual and ultrasonic examinations are contained in the Seabrook Station Reference Manual - RCS Materials Degradation Management Reference. The near term inspection schedule for the cold leg nozzles A, B, C, and D, calls for a bare metal visual inspection during refueling outage 16 (Spring of 2014) and ultrasonic examination during refueling outage 17 (Fall of 2015).

f. Reactor Vessel Bottom Mounted Instrumentation Penetrations:

ASME Code Case N-722 requires bare metal visual inspection of the Reactor Vessel bottom head penetrations every other refueling outage.

<u>Element 6 - Acceptance Criteria</u>

For the Reactor Vessel core support pads/lugs and clevis inserts, the Seabrook ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program conducts visual VT-1 examination of the accessible welds. The Seabrook ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program require that indications and relevant conditions detected during examination be evaluated in accordance with ASME Section XI, Paragraph IWB-3520.1.

The acceptance standards of ASME Section XI, Paragraph IWB-3522 are also applied to relevant indications identified during system pressure testing performed in accordance with ASME Section XI, Table IWB-2500-1, Examination Category B-P.

Reactor Vessel bottom head bare metal visual examinations are performed in order to identify very small volumes of boric acid that may result from Alloy 600 PWSCC. The acceptance criteria for this examination is the lack of any relevant indication, namely evidence of any leakage arising from the penetration to head interface, and the lack of any boric acid accumulations on the carbon steel head surfaces that may result in corrosion. The acceptance standards are in accordance with ASME Section XI, Paragraph IWB-3522 per ASME Code Case N-722, subject to the conditions specified in 10 CFR 50.55a(g)(6)(ii)(E).

The acceptance criteria, against which the need for corrective actions are evaluated, ensure that the component intended functions are maintained under all current licensing basis design conditions during the period of extended operation.

<u>Element 7 - Corrective Actions</u>

Indications are evaluated per the acceptance criteria, which determine relevant flaw indications that are unacceptable for further service. Unacceptable flaw indications are corrected through implementation of appropriate repair/replacement activities.

If visual examination of the Reactor Vessel instrumentation tube penetrations (bottom head) in accordance with ASME Code Case N-722 identifies leakage or evidence of cracking, additional actions will be performed as specified in paragraphs 10 CFR 50.55a(g)(6)(ii)(E)(2) through (4).

If PWSCC related indications are detected in the pressurizer surge nozzle full structural weld overlay, the repair/replacement activity will include removal of the weld overlay and the original dissimilar metal weld.

Repair/replacement activities comply with ASME Section XI as invoked by 10 CFR 50.55a or approved ASME Code Cases as referenced in the latest version of NRC Regulatory Guide 1.147, *"Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1."* Proposed alternative repair/replacement activities, if any, will be submitted to the NRC for review and approval in accordance with 10 CFR 50.55a (a)(3)(i) or 10 CFR 50.55a(a)(3)(ii).

Identified flaw indications are entered into the Seabrook Station Corrective Action Program for appropriate disposition. A repair, replacement or evaluation is performed for all flaw indications that exceed the acceptance criteria.

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 7 Corrective Actions.

Element 8 - Confirmation Process

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 8 Confirmation Process.

Element 9 - Administrative Controls

The FPL/NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 9 Administrative Controls.

Element 10 - Operating Experience

A review of operating experience for the Seabrook Station Nickel-Alloy Nozzles and Penetrations Program identified no adverse trends with program performance. The review of operating experience, as discussed below, indicates that the Nickel-Alloy Nozzles and Penetrations Program is effective in utilizing inspections, mitigation techniques, and repair/replacement activities.

1. During Refueling Outage 7 (Fall of 2000), insulation was removed from the Reactor Vessel hot leg nozzles and a bare metal visual examination

conducted. This was in response to through-wall leakage discovered at V.C.Summer. No evidence of pressure boundary leakage was observed.

2. During Refueling Outage 9 (Fall of 2003), inspection of the lower Reactor Vessel head bottom mounted instrumentation penetrations was conducted. No evidence of boric acid leakage was observed on the 58 bottom mounted instrumentation penetrations. Tape residue and boric acid trails were observed on the bottom head surface. Subsequently, the tape residue was evaluated by Engineering and determined to be acceptable. Additionally, three small boric acid drip ends were obtained for analysis, which revealed the boric acid to be greater than 7 years old. This was consistent with previous analysis and known cavity seal ring leakage prior to installation of the permanent cavity seal ring. The three subject locations were cleaned and inspected. The inspection results revealed no areas of metal degradation.

3. During Refueling Outage 10 (Spring of 2005), bare metal visual inspection of six Pressurizer butt welds and four Steam Generator bowl drain connections were conducted. The Pressurizer butt welds included a surge nozzle on the bottom, three safety nozzles, one relief nozzle, and a spray nozzle on top. The four Steam Generator bowl drains and four Pressurizer nozzles showed no evidence of leakage. Two nozzle welds on the Pressurizer exhibited white residue believed to be liquid penetrant developer. These two nozzles were Liquid Penetrant tested to verify no weld indications existed.

4. During Refueling Outage 11 (Fall of 2006), bare metal visual inspection was performed on six Pressurizer butt welds, four Steam Generator bowl drains, eight Reactor Vessel butt welds, Reactor Vessel O-ring leak taps, and Reactor Vessel Bottom Mounted Nozzles. None of these inspections showed evidence of leakage.

5. During Refueling Outage 12 (Spring of 2008), the six pressurizer nozzles were mitigated by installing full structural weld overlays using Alloy 52M weld material. Additionally, Bare Metal Visual examinations were performed on the four Steam Generator bowl drains with satisfactory results.

6. During Refueling Outage 13 (Fall of 2009), all eight Reactor Vessel nozzle butt welds were volumetrically inspected to satisfy the requirements of ASME Section XI and EPRI MRP-139 examination requirements. This meets the mandatory inspection deadline of December 31, 2009, for the hot legs and December 31, 2010, for the cold legs. During the inspection an axial flaw indication was found on Reactor Vessel loop “D” hot leg nozzle in the alloy 82/182 material connected to the inner diameter. That nozzle was

subsequently mitigated by the Mechanical Stress Improvement Process. Other alloy 600 locations inspected in Refueling Outage 13 were the Reactor Vessel bottom mounted nozzles, Reactor Vessel o-ring leak off lines, and the steam generator bowl drains. These inspections were satisfactory

The "D" hot leg nozzle axial flaw indication was identified as an inside diameter connected planar flaw in the Reactor Vessel outlet nozzle-to-safe-end dissimilar metal weld located at vessel orientation 158°. This approximately 21% through-wall flaw exceeded the acceptance standards contained in ASME Section XI, Table IWB-3410-1.

The ASME Code allows flaw acceptance if they meet specific analytical analysis. A Seabrook Station document *"Seabrook Reactor Vessel Outlet Nozzle Dissimilar Metal Weld Flaw Evaluation"* provides an analysis that concluded the flaw has an allowable service life of just under 36 months to remain in compliance with ASME Section XI. However, Seabrook Station elected to mitigate the subject location during Refueling Outage 13 to prevent flaw propagation through the next operating cycle. The mitigation technique of mechanical stress improvement process was chosen. This is a proven and accepted process, which prevents flaw initiation and flaw propagation.

The cause evaluation concluded that based on published information, the likely cause of the flaw was the susceptible Alloy 600 material being exposed to primary system fluid at hot leg temperature for 16.53 effective full power years.

Corrective actions taken included:

a) A detailed review of the previous 1999 electronic ultrasonic data for the Reactor Vessel outlet nozzle-to-safe-end weld at 158° was performed to determine if the newly detected flaw was present in the 1999 data. This review was performed using the same data analysis software that was used for the 2009 examination. After a thorough review of the data by the vendor, EPRI, and the Seabrook Station Level III UT examiner, it was determined that the newly reported flaw was not present in the 1999 data; and

b) An extent of condition review was performed. The Seabrook Station Reference Manual - RCS Materials Degradation Management Reference was previously issued to address Seabrook Station's plan to mitigate these welds. The manual lists the Alloy 600 locations (including the 4 hot and 4 cold legs) and inspection schedules. The Seabrook Station manual also incorporates the guidance published in EPRI MRP-139. The six butt welds on the Pressurizer had already been mitigated during Refueling Outage 12

(Spring of 2008) by full structural weld overlay. This process adds non-susceptible weld material over the susceptible area essentially rendering a new pressure boundary. Future plans include mitigation of remaining butt welds on the Reactor Vessel nozzle to safe-end welds using an approved mitigation technique. Currently, mechanical stress improvement process and weld overlay are approved techniques.

The above operating experience examples provide objective evidence that the Seabrook Station Nickel-Alloy Nozzles and Penetrations Program effectively monitors the condition of components within the license renewal boundary and ensures aging effects are acceptably managed.

Exceptions to NUREG-1800

None

Enhancements

None

Conclusion

The Seabrook Station Nickel-Alloy Nozzles and Penetration Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.3 NUREG-1801 CHAPTER X AGING MANAGEMENT PROGRAMS

B.2.3.1 METAL FATIGUE OF REACTOR COOLANT PRESSURE BOUNDARY

Program Description

The Metal Fatigue of the Reactor Coolant Pressure Boundary Program is an existing program that includes measures to prevent fatigue cracking caused by anticipated cyclic strains in metal components of the Reactor Coolant pressure boundary. This is accomplished by monitoring and tracking critical thermal pressure transients for select Reactor Coolant system components ensuring the number of design transient cycles is not exceeded during the operating life. Based on design basis screening criteria, a list of fatigue-sensitive components is developed and maintained. Fatigue-sensitive components include locations such as the Reactor Vessel Shell and Lower Head, Reactor Vessel Inlet and Outlet Nozzles, Pressurizer Surge Line (Hot Leg and Pressurizer Nozzles), Reactor Coolant Piping Charging System Nozzle, Reactor Coolant Piping Safety Injection Nozzle, and Residual Heat Removal (RHR) System Class 1 Piping.

The Metal Fatigue of Reactor Pressure Boundary Program is a preventive program that monitors and tracks the number of critical thermal and pressure transients to ensure that the cumulative usage fatigue (CUF) for select reactor coolant system components remain less than 1.0 through the period of extended operation. The program determines the number of transients that occur and updates 60-year projections on an annual basis. The program is credited with monitoring CUF of the reactor vessel, the pressurizer, the steam generators, Class 1 and non-Class 1 piping, and Class 1 components subject to the reactor coolant, treated borated water, and treated water environments. The program will use fatigue monitoring software to monitor the number of cycles a system or component endures. Pre-established cycle limits will identify components approaching design limits. Components approaching design limits will be reanalyzed, inspected, repaired or replaced in accordance with applicable design codes.

NUREG/CR-6260, *“Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components”,* provides specific guidance to address environmental effects and recommendations for selection of critical components in high-fatigue usage locations that should be monitored. Formulas for calculating the environmental correction factors for carbon and low alloy steel, and stainless steel are contained in NUREG/CR-6583*, “Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-*

Alloy Steels", and NUREG/CR-5704, *"Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels",* respectively.

Seabrook Station has ensured the environmental effect on fatigue sensitive locations are addressed for the period of extended operation. Where specific component monitoring is required, software will track individual cycles and events. Locations with CUF approaching the design limit will be reanalyzed, inspected, repaired, or replaced as necessary in accordance with applicable design codes. Corrective action may encompass one of several activities:

1. Reanalyze affected component(s) for an increase in the number of that specific transient while accounting for other component-affecting plant transients that may be projected not to achieve their analyzed levels.

2. Perform a fracture mechanics evaluation of a postulated flaw in affected plant components, which, when coupled with an inservice inspection program, will serve to demonstrate flaw tolerant behavior.

3. Repair the affected component.

4. Replace the affected component.

The evaluation of environmental fatigue effects for the Reactor Vessel Shell and Lower Head and Reactor Vessel Inlet and Outlet Nozzles found that the CUF will remain below the ASME code allowable fatigue limit of 1.0 using the maximum applicable F_{en}, when extended to 60 years. The evaluation of fatigue effects for these locations has thereby been validated for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(i), including effects of the reactor coolant environment.

The remainder of these locations, RCS Pressurizer Surge Line Nozzle, RCS Charging Nozzle, RCS Safety Injection Nozzle, and RCS Residual Heat Removal System Class 1 Piping, were analyzed in accordance with NB-3200, based on Seabrook Specific conditions and will be monitored for fatigue usage including environmental effects by the Metal Fatigue of Reactor Coolant Pressure Boundary Program. Pre-established action limits will permit completion of corrective actions before the design basis number of events is exceeded, and before the cumulative usage factor, including environmental effects, exceeds the ASME Code limit of 1.0.

Two locations that were analyzed to have a CUF, including environmental effects, greater than 1.0, during the period of extended operation, are the Surge Line Hot Leg Nozzle-to-Pipe Weld and the Charging Nozzle near Blend Radius. At least two (2) years prior to entering the period of extended operation, for the plant-specific locations listed in NUREG/CR-6260 for newer vintage Westinghouse plants, Seabrook Station will implement the following.

1. Seabrook Station will update the fatigue usage calculations using refined fatigue analyses, if necessary, to determine acceptable CUFs (i.e., less than 1.0) when accounting for the effects of the reactor water environment. This includes applying the appropriate F_{en} factors to valid CUFs determined from an existing fatigue analysis valid for the period of extended operation or from an analysis using an NRC-approved version of the ASME code or NRC-approved alternative (e.g., NRC-approved code case). Formulas for calculating the environmental life correction factors for carbon and low alloy steels are contained in NUREG/CR-6583 and those for austenitic stainless steels are contained in NUREG/CR-5704. NUREG/CR-6909 includes alternate formulas for calculating environmental life correction factors, in addition to updated fatigue design curves.

2. If acceptable CUFs cannot be demonstrated for the selected locations, then additional plant-specific locations will be evaluated. For the additional plant-specific locations, if CUF including environmental effects are greater than 1.0, then Corrective Actions will be initiated. Corrective Actions will include inspection, repair, or replacement of the affected locations before exceeding a CUF of 1.0 or the effects of fatigue will be managed by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method accepted by the NRC).

The Metal Fatigue of Reactor Coolant Pressure Boundary Program will maintain fatigue within the design code limit through the period of extended operation. The software program will monitor cycles to verify cycle limits are maintained below limits specified in the UFSAR.

The program includes generation of a periodic fatigue monitoring report, including a listing of transient events, cycle summary event details, cumulative usage factors, a detailed fatigue analysis report, and a cycle projection report. If the fatigue usage for any location has had an unanticipated increase based on cycle accumulation trends or if the number of cycles is approaching their limit, the corrective action program is used to evaluate the condition and determine the corrective action. Acceptable corrective actions include a more rigorous analysis of the component to demonstrate that the design code limit will not be exceeded during the period of extended operation, inspection of the component, repair of the component, and replacement of the component. Corrective actions include a review of additional affected reactor coolant pressure boundary locations.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 X.M1.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be made prior to entering the period of extended operation.

1. The Metal Fatigue of Reactor Coolant Pressure Boundary program will be enhanced to include additional transients beyond those defined in the Technical Specifications and UFSAR.

   Program Elements Affected: Element 3 (Parameters Monitored/Inspected).

2. The program will be enhanced to use a software program to count transients to monitor cumulative usage on select components.

   Program Elements Affected: Element 1 (Scope of Program), Element 3 (Parameters Monitored/Inspected), Element 5 (Monitoring and Trending), and Element 6 (Acceptance Criteria).

Operating Experience

Demonstration that the aging effects are effectively managed is achieved through objective evidence that shows aging effects and mechanisms are being adequately managed. The following examples provide objective evidence that the Metal Fatigue of Reactor Coolant Pressure Boundary program will be effective in assuring that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

1. NRC Bulletin 88-11, issued in December 1988, requested utilities to establish and implement a program to confirm the integrity of the pressurizer surge line. The program required both visual inspection of the surge line and demonstration that the design requirements of the surge line are satisfied, including the consideration of stratification effects.

   In 1989, Seabrook Station responded to the NRC Bulletin 88-11, by analyzing and demonstrating the acceptability of stress fatigue in the pressurizer surge line. Seabrook Station reviewed the pressurizer surge line temperature and displacement data collected during the first operating cycle and verified that this data was enveloped by the thermal stratification design transients used in the structural and fatigue evaluation of the pressurizer surge line. The results indicated that the cumulative usage factor met the acceptance criteria of less than 1.0.

This example provides objective evidence that the existing Metal Fatigue of Reactor Coolant Pressure Boundary program is capable of utilizing industry information in preventing cumulative fatigue damage of sample reactor coolant system components.

2. NRC Bulletin 88-08 was issued June 22, 1988 with supplements in 1988 and 1989 because of observed pipe cracking due to valve leakage in unisolable lines. The Bulletin required that licensees identify potential locations that might be subject to high stresses due to leaking valves, inspect the potential locations, and to assure that susceptible locations will not fail for the remaining life of the unit.

   Seabrook Station evaluated the possibility of fluid in-leakage by identifying seven piping sections that are unisolable from the Reactor Coolant System and pressurized by the charging pumps. These areas were evaluated for the effects of thermal stresses due to leaking valves that could potentially experience in-leakage to the Reactor Coolant System. Four of the lines are the High Head Safety Injection lines and the other three are the Charging System lines. In 1988, Seabrook Station performed a one-time non-destructive examination for the four High Head Safety Injection lines, showing acceptable results. Non-destructive examinations were not considered to be necessary for the three Charging System lines because they had not yet been subjected to excessive thermal cycling at that time.

   Additionally, a temperature monitoring program for the High Head Safety Injection and Charging System lines was deployed in 1989. In this program, temperature detectors were installed on the unisolable piping sections to detect adverse temperature distributions, appropriate temperature limits were established, requirements for periodic review of the temperature instrument values were established, and action limits put into place in the event of exceeding the temperature limit.

   Seabrook Station evaluated the possibility and effects of fluid out-leakage and concluded that unisolable piping sections connected to the Reactor Coolant System at Seabrook Station are not subject to stresses from thermal stratification or temperature oscillations resulting from the mechanism described in NRC Bulletin. This example provides objective evidence that the existing Metal Fatigue of Reactor Coolant Pressure Boundary program is capable of utilizing industry information to determine components and locations subject to thermal and cyclic fatigue

3. To validate that transient cycle design limits are not exceeded, the Seabrook Station Engineering Department tracks and reports cumulative cycles in a quarterly surveillance report. The report, performed under the cycle counting procedure, details components surveyed, transients counted, and their design and report limits. All monitored cycles have been within their limit, with sufficient margin in the 40-year design limits. This example provides objective evidence that the existing Metal Fatigue of Reactor Coolant Pressure Boundary program is capable of monitoring aging effects associated with metal fatigue of reactor coolant system components.

4. To support the 60-year TLAAs associated with metal fatigue of the reactor coolant system pressure boundary components, Seabrook Station analyzed the projected cumulative usage factor, incorporating the environmental fatigue effects for seven (7) NUREG/CR-6260 locations; Reactor Vessel Shell and Lower Head, Reactor Vessel Inlet Nozzle, Reactor Vessel Outlet Nozzle, Surge Line Hot Leg Nozzle, Charging System Nozzle, Safety Injection Nozzle, and the RHR Suction Nozzle. The analyses found the environmentally-adjusted cumulative usage factors will exceed 1.0 for 60 years of service for the surge line hot leg nozzle and the charging nozzle. Enhancements to the program will identify degradation prior to failure. Guidance for evaluation, inspection, repair, and/or replacement is provided for locations where degradation is identified.

   There is sufficient confidence that implementation of the Metal Fatigue of Reactor Coolant Pressure Boundary Program will effectively identify degradation and therefore prevent failure.

Conclusion

The Metal Fatigue of Reactor Coolant Pressure Boundary Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.3.2 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC COMPONENTS

Program Description

The Seabrook Station Environmental Qualification (EQ) of Electric Components program is an existing program, implemented through station procedures and preventive maintenance tasks. The EQ program complies with 10 CFR 50.49, *"Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants".* The EQ program manages component thermal, radiation and cyclic aging through the use of 10 CFR 50.49(f) qualification methods. All EQ equipment is included within the scope of License Renewal. Qualified lives are determined for equipment within the scope of the EQ program and appropriate actions such as replacement, refurbishment or re-evaluation are taken prior to the end of the qualified life of the equipment so that the aging limit is not exceeded. Refer to Section 4.4 for a discussion of EQ program reanalysis attributes.

The Environmental Qualification (EQ) of Electric Components program addresses the low voltage I&C cable issues, consistent with those described in the closure of Generic Safety Issue 168 (GSI 168), *"Environmental Qualification of Electrical Equipment"*.

NUREG-1801 Consistency

This program is consistent with NUREG-1801 X.E1.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Seabrook Station EQ program is an existing program and has been maintained by on-site Engineering personnel since its inception. Seabrook Station has a comprehensive Operating Experience Program that monitors industry issues/events and assesses these for applicability to its own operations. In addition, the Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues/events. Those issues and events, whether external or plant specific, that are potentially significant to Seabrook Station are evaluated. The EQ Coordinator is responsible for reviewing the disposition of such documents as well as subsequent assignment of actions to be taken at Seabrook Station and, confirming that completion of the actions has satisfactorily addressed potential EQ aging issues. The EQ coordinator participates in NUGEQ, the industry EQ group. The EQ coordinator reviews design changes for impact on the EQ program.

EQ System Health Reports are issued quarterly. The parameters monitored within the health reports include EQ regulatory compliance, self-assessments, corrective actions, documentation updates, equipment failures and outage activities. Areas for improvement and conditions requiring action are addressed in action plans.

Data loggers are used in select locations to monitor area temperatures to confirm assumptions and to adjust qualified lives, including both reduction and extension.

The EQ Program documentation underwent a significant review and updating as part of the power uprate project in the 2005-2006 timeframe.

The following are representative condition report samples which indicate that critical aspects of the EQ program are being routinely monitored and evaluated.

a. A condition report addressed extending EQ activities based on actual time of energization of solenoids.

b. A condition report addressed reducing solenoid qualified lives based on temperature monitoring.

c. A condition report addressed documents the failure analysis for an EQ component which failed prior to its designed end of life.

d. A condition report addressed addresses the potential loss of the environmental seal due to the twisting of a transmitter's electronics housing.

e. A condition report addressed addresses potentially different grease being used on EQ fan motor bearings.

f. A condition report addressed addresses the inclusion of a new cable EQ test report into the EQ file.

The operating experience of the EQ program did not show any adverse trend in performance. The problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. The key elements of the EQ program are being monitored and effectively implemented. There is sufficient confidence that the implementation of the EQ program will effectively manage the aging of components. Guidance for the re-evaluation, refurbishment or replacement is provided. Periodic self-assessments of the EQ program are performed to identify the areas that need improvement to maintain the performance of the program.

Conclusion

The Seabrook Station Environmental Qualification (EQ) of Electric Components Program provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

APPENDIX C

NOT USED

APPENDIX D

TECHNICAL SPECIFICATION CHANGES
(NOT USED)

APPENDIX E

ENVIRONMENTAL REPORT FOR SEABROOK STATION

(SEE ADDITIONAL BINDER)