LICENSE RENEWAL APPLICATION

LaSalle County Station, Units 1 and 2

Facility Operating License Nos.
NPF-11 and NPF-18

TABLE OF CONTENTS

SECTION 1

Administrative Information

SECTION 2

SECTION 3

SECTION 4

List of Appendices

List of Tables

List of Figures

1.0 ADMINISTRATIVE INFORMATION

1.1 GENERAL INFORMATION - 10 CFR 54.19

1.1.1 NAME OF APPLICANT

Exelon Generation Company, LLC (Exelon), hereby applies for renewed operating licenses for LaSalle County Station, Units 1 and 2 (LSCS).

1.1.2 ADDRESS OF APPLICANT

Exelon Generation Company, LLC
200 Exelon Way
Kennett Square, PA 19348

1.1.3 DESCRIPTIONS OF BUSINESS OR OCCUPATION OF APPLICANT

Exelon Generation Company, LLC is a Delaware limited liability company which is wholly owned by Exelon Ventures Company, a Delaware limited liability company, which in turn is wholly owned by Exelon Corporation, a corporation formed under the laws of the Commonwealth of Pennsylvania. Exelon Generation Company, LLC is the licensed operator of LaSalle County Station, Units 1 and 2, which is the subject of this application. The current LaSalle County Station, Units 1 and 2 operating licenses will expire as follows:

- At midnight on April 17, 2022 for Unit 1 (Facility Operating License No. NPF-11).
- At midnight December 16, 2023 for Unit 2 (Facility Operating License No. NPF-18).

Exelon Generation Company, LLC will continue as the licensed operator on the renewed operating licenses.

1.1.4 DESCRIPTIONS OF ORGANIZATION AND MANAGEMENT OF APPLICANT

Exelon Corporation is a corporation organized under the laws of the Commonwealth of Pennsylvania with its headquarters and principal place of business in Chicago, Illinois. Exelon Corporation is a publicly traded corporation whose shares are widely traded on the New York Stock Exchange. Exelon Generation Company, LLC, is organized under the laws of the Commonwealth of Pennsylvania. Exelon Generation Company, LLC does not have a board of Directors. All of the Principal Officers of Exelon Generation Company, LLC are U.S. citizens. Exelon Generation Company, LLC is not owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. The

Principal Officers of Exelon Generation Company, LLC, and their addresses, are presented below:

Principal Officers (Exelon Generation Company, LLC)		
Name	**Title**	**Address**
Kenneth W. Cornew	President and CEO Exelon Generation	200 Exelon Way Kennett Square, PA 19348
Michael J. Pacilio	Senior Vice President Exelon Generation; President and Chief Nuclear Officer, Exelon Nuclear	4300 Winfield Road Warrenville, IL 60555
Bryan C. Hanson	Exelon Nuclear Chief Operating Officer	4300 Winfield Road Warrenville, IL 60555
Ronald J. DeGregorio	Senior Vice President Exelon Generation; President, Exelon Power	300 Exelon Way Kennett Square, PA 19348
John F. Barnes	Chief Operating Officer, Exelon Power	300 Exelon Way Kennett Square, PA 19348
Joseph Nigro	EVP, Exelon and CEO Constellation	111 Market Place, Baltimore, MD 21202
Mark P. Huston	President, Retail,	111 Market Place, Baltimore, MD 21202
Edward J Quinn	President, Wholesale	111 Market Place, Baltimore, MD 21202
Bryan P. Wright	Chief Financial Officer	111 Market Place, Baltimore, MD 21202
Paymon Aliabadi	Chief Enterprise Risk Officer	10 S. Dearborn St, Chicago, IL 60603

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

Exelon Generation Company, LLC requests renewal of the Class 103 operating licenses for LaSalle County Station, Units 1 and 2, for a period of 20 years beyond the expiration of the current licenses to allow continued use of the facilities for the commercial generation of electricity. LSCS Unit 1 license (NPF-11) expires at midnight on April 17, 2022. LSCS Unit 2 license (NPF 18) expires at midnight on December 16, 2023.

In this application, Exelon Generation Company, LLC also requests the renewal of specific licenses under 10 CFR Parts 30, 40, and 70 that are subsumed in or combined with the current operating licenses.

1.1.6 EARLIEST AND LATEST DATES FOR ALTERATIONS, IF PROPOSED

No physical plant alterations or modifications have been identified as necessary in connection with this application.

1.1.7 RESTRICTED DATA

With regard to the requirements of 10 CFR 54.17(f), this application does not contain any “Restricted Data,” as that term is defined in the Atomic Energy Act of 1954, as amended, or other defense information, and it is not expected that any such information will be part of the licensed activities.

In accordance with the requirements of 10 CFR 54.17(g), the applicant will not permit any individual to have access to, or any facility to possess restricted data or classified national security information until the individual and/or facility has been approved for such access under the provisions of 10 CFR Parts 25 and/or 95.

1.1.8 REGULATORY AGENCIES

Exelon Generation Company, LLC recovers its share of the costs incurred from operating LaSalle County Station, Units 1 and 2, in its own wholesale rates. The rates charged and services provided by Exelon Generation Company, LLC are subject to regulation by the Federal Energy Regulatory Commission under the Federal Power Act. Exelon Generation Company, LLC is also subject to regulation as a public utility company by the Securities and Exchange Commission under the Public Utility Holding Company Act of 1935, as amended.

Securities and Exchange Commission
450 Fifth Street, NW
Washington, DC 20549

Federal Energy Regulatory Commission
888 First St. N.E.
Washington, DC 20426

1.1.9 LOCAL NEWS PUBLICATIONS

News publications in circulation near LaSalle County Station, Units 1 and 2 that are considered appropriate to give reasonable notice of the application are as follows:

The Times
110 W. Jefferson St.
Ottawa, IL 61350

The News Tribune
426 Second St.
LaSalle, IL 61301

The Morris Daily Herald
1804 N. Division St.
Morris, IL 60450

1.1.10 CONFORMING CHANGES TO STANDARD INDEMNITY AGREEMENT

10 CFR Part 54.19(b) requires that “each application must 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-84) for LaSalle County Station, Units 1 and 2, states in Article VII that the agreement “*shall terminate at the time of expiration of that license specified in Item 3 of the Attachment to the agreement, which is the last to expire; provided that, except as may otherwise be provided in applicable regulations or orders of the Commission, the term of this agreement shall not terminate until all the radioactive material has been removed from the location and transportation of the radioactive material from the location has ended as defined in subparagraph 5(b), Article I*”. Item 3 of the Attachment to the indemnity agreement includes license numbers NPF-11 and NPF-18. Applicant requests that any necessary conforming changes be made to Article VII and Item 3 of the Attachment, and any other sections of the indemnity agreement as appropriate to ensure that the indemnity agreement continues to apply during both the terms of the current licenses and the terms of the renewed licenses. Applicant understands that no changes may be necessary for this purpose if the current license numbers are retained.

1.2 GENERAL LICENSE INFORMATION

1.2.1 APPLICATION UPDATES, RENEWED LICENSES, AND RENEWAL TERM OPERATION

In accordance with 10 CFR 54.21(b), during NRC review of this application, an annual update to the application to reflect any change to the current licensing basis that materially affects the contents of the license renewal application will be provided.

In accordance with 10 CFR 54.21(d), Exelon Generation Company, LLC will maintain a summary list in the LSCS Updated Final Safety Analysis Report (UFSAR) of activities that are required to manage the effects of aging for the systems, structures or components in the scope of license renewal during the period of extended operation and summaries of the time-limited aging analyses evaluations.

1.2.2 INCORPORATION BY REFERENCE

There are no documents incorporated by reference as part of the application. Any document references, either in text or in Section 1.7 are listed for information only.

1.2.3 CONTACT INFORMATION

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

Michael P. Gallagher
Vice President License Renewal Projects
Exelon Generation Company, LLC
200 Exelon Way
Kennett Square, PA 19348

with copies to:

Albert A. Fulvio
Manager License Renewal
Exelon Nuclear
200 Exelon Way
Kennett Square, PA 19348

Shannon Rafferty-Czincila
License Renewal Project Technical Lead
Exelon Nuclear
200 Exelon Way
Kennett Square, PA 19348

1.3 PURPOSE

This document provides information required by 10 CFR 54 to support the application for renewed licenses for LaSalle County Station Units 1 and 2. The application contains technical information required by 10 CFR 54.21 and environmental information required by 10 CFR 54.23. The information contained herein is intended to provide the NRC with an adequate basis to make the findings required by 10 CFR 54.29.

1.4 DESCRIPTION OF THE PLANT

The LaSalle County Station, Units 1 and 2 is a dual unit facility located in the agricultural area of Brookfield Township, LaSalle County, Illinois. It is approximately 55 direct-line miles southwest of Chicago. The plant is on flat terrain about 220 feet above the Illinois River channel which traverses north central Illinois some 3.5 miles to the north of the site.

The power generation complex includes several contiguous buildings, two Reactor buildings, an Auxiliary building (housing the control room), the Turbine building, Diesel-Generator buildings, the Radwaste building, the Service building, and the Offgas building. Other buildings such as the gatehouse, warehouses, etc., are also located in the general plant area. A lake screen house on the intake flume is located about 800 feet east of the main building complex. A small river screen house, located on the Illinois River, provides makeup water to the cooling lake for the LaSalle County Station.

The nuclear reactor system for each LSCS unit includes a single-cycle, forced circulation, General Electric boiling-water reactor (GE BWR Type 5). Both units were approved for a 5% stretch power uprate on May 9 of 2000 followed by a 1.65% Measurement Uncertainty Recapture (MUR) power uprate on September 16, 2010. Each LSCS unit reactor is currently licensed to a rated core thermal power of 3546 MWt and is housed within GE Mark II (wet) containment. Normal heat sink cooling for the station is provided from a perched cooling lake of 2058 acres. The ultimate heat sink for emergency core cooling is a submerged pond and intake flume that underlies the cooling lake and the natural grade of the site. The gross electric output of each unit is approximately 1207 MWe and the net output of each unit is approximately 1178 MWe from each General Electric (GE) turbine-generator. The NSSS supplier was GE (Nuclear Energy Division). The plant, except for the NSSS, was designed by Sargent & Lundy (S&L) Engineers.

1.5 APPLICATION STRUCTURE

This license renewal application is structured in accordance with Regulatory Guide 1.188, “Standard Format and Content for Applications to Renew Nuclear Plant Operating Licenses,” and NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule,” Revision 6. In addition, Section 3, Aging Management Review Results and Appendix B, Aging Management Programs and activities are structured to address the guidance provided in NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants”, Revision 2. NUREG-1800 references NUREG-1801, “Generic Aging Lessons Learned (GALL) Report,” Revision 2. NUREG-1801 was used to determine the adequacy of existing programs for purposes of managing aging and which existing programs should be augmented for license renewal. The results of the aging management review, using NUREG-1801, have been documented and are illustrated in table format in Section 3, “Aging Management Review Results” of this application.

The application is divided into the following major sections:

Section 1 – Administrative Information

This section provides the administrative information required by 10 CFR 54.17 and 10 CFR 54.19. It describes the plant and states the purpose for this application. Included in this section are the names, addresses, business descriptions, and organization and management descriptions of the applicant, as well as other administrative information. This section also provides an overview of the structure of the application, general references, and a listing of acronyms used throughout the application.

Section 2 – Structures and Components Subject To Aging Management Review

This section describes and justifies the methods used in the integrated plant assessment to identify those structures and components subject to an aging management review in accordance with the requirements of 10 CFR 54.21(a)(2). These methods consist of: 1) scoping, which identifies the systems, structures, and components that are within the scope of 10 CFR 54.4(a), and 2) screening under 10 CFR 54.21(a)(1), which identifies those in scope structures and components that perform their intended function without moving parts or a change in configuration or properties, and that are not subject to replacement based on a qualified life or specified time period.

Additionally, the results for systems and structures are described in this section. Scoping results are presented in Section 2.2 "Plant Level Scoping Results”. Screening results are presented in Sections 2.3, 2.4, and 2.5.

The screening results consist of lists of passive long-lived mechanical and structural components that require aging management review. Brief descriptions of mechanical systems and structures within the scope of license renewal are provided as background information. Mechanical system and structure intended functions are provided for in scope systems and structures. For each in scope system and structure, components requiring an aging management review are identified, associated component intended functions are identified, and appropriate reference to the Section 3 Table providing the aging management review results is made.

Electrical components and selected structural components, such as electrical cables and component supports, respectively, were evaluated as commodities. Under the commodity approach, components were evaluated based upon common environments and materials. Components requiring an aging management review are presented in Sections 2.4 and 2.5. Component intended functions and reference to the applicable Section 3 Table is provided.

Section 3 – Aging Management Review Results

10 CFR 54.21 (a)(3) requires a demonstration that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the current licensing basis throughout the period of extended operation. Section 3 presents the results of the aging management reviews. Section 3 is the link between the scoping and screening results provided in Section 2 and the aging management programs provided in Appendix B.

Aging management review results are presented in tabular form, in a format in accordance with NUREG-1800, "Standard Review Plan for Review of License Renewal Applications." For mechanical systems, aging management review results are provided in Sections 3.1 through 3.4 for the Reactor Vessel, Internals, and Reactor Coolant System; Engineered Safety Features, Auxiliary Systems, and Steam and Power Conversion System respectively. Aging management review results for containments, structures, and component supports are provided in Section 3.5. Aging management review results for electrical and instrumentation and controls are provided in Section 3.6.

Tables are provided in each of these sections in accordance with NUREG-1800, which provide aging management review results for components, materials, environments, and aging effects which are addressed in NUREG-1801, and information regarding the degree to which the proposed aging management programs are consistent with those recommended in NUREG-1801.

Section 4 – Time-Limited Aging Analyses

Time-limited aging analyses (TLAAs), as defined by 10 CFR 54.3 are listed in this section. This section includes each of the TLAAs identified in the NRC Standard Review Plan for License Renewal Applications and in LSCS plant-specific analyses. This section includes a summary of the time-dependent aspects of the analyses. A demonstration is provided to show that the analyses remain valid for the period of extended operation, the analyses have been projected to the end of the period of extended operation, or the effects of aging on the intended function(s) will be adequately managed for the period of extended operation, consistent with 10 CFR 54.21(c)(1)(i)-(iii).

Appendix A –Updated Final Safety Analysis Report Supplement

As required by 10 CFR 54.21(d), the Updated Final Safety Analysis Report (UFSAR) supplement contains a summary of activities credited for managing the effects of aging for the period of extended operation. In addition, summary descriptions of time-limited aging analyses evaluations are provided. Table 3.0-1, “FSAR Supplement for Aging Management of Applicable Systems,” from Revision 2 of NUREG-1800 was used as guidance for the content of the applicable aging management program summaries.

Appendix B – Aging Management Programs

Appendix B describes the programs and activities that are credited for managing aging effects for components or structures during the period of extended operation based upon the aging management review results provided in Section 3 and the time-limited aging analyses results provided in Section 4.

Sections B.2 and B.3 discuss those programs that are contained in Section XI and Section X, respectively, of NUREG-1801. A description of the aging management program is provided and a conclusion is drawn based upon the results of an evaluation to each of the ten elements provided in NUREG-1801. In some cases, exceptions and justifications for managing aging are provided for specific NUREG-1801 elements. Additionally, operating experience related to the aging management program is provided.

Appendix C – Response to BWRVIP License Renewal Applicant Action Items

This Appendix provides the requested responses to applicant action items contained in the NRC safety evaluation reports associated with NRC approved Boiling Water Reactor Vessel and Internals Program reports.

Appendix D – Technical Specification Changes

This Appendix satisfies the requirement in 10 CFR 54.22 to identify technical specification changes or additions necessary to manage the effects of aging during the period of extended operation. There were no Technical Specification Changes identified necessary to manage the effects of aging during the period of extended operation.

Appendix E – Environmental Information – LaSalle County Station Units 1 and 2

This Appendix satisfies the requirements of 10 CFR 54.23 to provide a supplement to the environmental report that complies with the requirements of subpart A of 10 CFR Part 51 for LaSalle County Station Units 1 and 2.

1.6 ACRONYMS

Acronym	**Meaning**
AC	Alternating Current
ACI	American Concrete Institute
AMP	Aging Management Program
AMR	Aging Management Review
ANL	Argonne National Laboratory
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	Anticipated transients without scram
BTP	Branch Technical Position
BWR	Boiling Water Reactor
BWRVIP	Boiling Water Reactor Vessels and Internals Project
C (ºC)	Degrees Celsius
CASS	Cast austenitic stainless steel
CFR	Code of Federal Regulations
CLB	Current licensing basis
CUF	Cumulative Usage Fatigue
CUF_{en}	Environmentally Adjusted Cumulative Usage Factor
DBA	Design basis accident
DBD	Design basis document
DBE	Design basis event
DC	Direct Current
DO	Dissolved Oxygen
DORL	Division of Operating Reactors Licensing
DOT	Department of Transportation
EAF	Environmentally-Assisted Fatigue
ECCS	Emergency Core Cooling System
ECT	Eddy Current Testing
EDG	Emergency Diesel Generator
EFPY	Effective full-power years
EPRI	Electric Power Research Institute

Acronym	Meaning
EPA	Environmental Protection Agency
EPU	Extended Power Uprate
EQ	Environmental Qualification
ESF	Engineered Safety Features
F (ºF)	Degrees Fahrenheit
FAC	Flow-accelerated corrosion
Fen	Environmentally Assisted Fatigue Correction Factor
FHAR	Fire Hazards Analysis Report
FHS	Fuel Handling and Storage System
FSAR	Final Safety Analysis Report
FSSD	Fire safe shutdown
GALL	Generic Aging Lessons Learned Report NUREG 1801
GL	Generic Letter
GSI	GSI Generic Safety Issue
HELB	High energy line break
HEPA	High efficiency particulate air
HVAC	Heating, ventilation, and air conditioning
HX	Heat exchanger
I & C	Instrumentation and controls
IASCC	Irradiation assisted stress corrosion cracking
IEEE	Institute of Electrical and Electronics Engineers
IGA	Intergranular Attack
IGSCC	Intergranular stress corrosion cracking
IN	Information Notice
INPO	Institute of Nuclear Power Operations
IPA	Integrated plant assessment
ISI	Inservice inspection
ISG	Interim Staff Guidance
IST	Inservice testing
LBB	Leak before break
LER	Licensee event report
LSCS	LaSalle County Station, Units 1 and 2
LLRT	Local leak rate test
LOCA	Loss-of-coolant accident
LRA	License Renewal Application

Acronym	Meaning
LTOP	Low Temperature Overpressure Protection
MCC	Motor control center
MEAP	Material/Environment/Aging affect/Program as summarized on AMR line-items
MG	Motor generator
MIC	Microbiologically influenced corrosion
MOV	Motor-operated valve
MSIV	Main steam isolation valve
MSIP	Mechanical Stress Improvement Process
MSV	Main stop valve
MSRV	Main Steam Relief Valve
MUR	Measurement Uncertainty Recapture (power uprate)
MWt	Megawatts-thermal
MWe	Megawatts-electric
NDE	Nondestructive examination
NDT	Nil Ductility Temperature
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NPS	Nominal Pipe Size
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NSR	Nonsafety-Related
OE	Operating experience
P&ID	Piping and instrumentation diagram
PM	Preventive maintenance
PTS	Pressurized Thermal Shock
P-T curves	Pressure-temperature limit curves
PUA	Plant-unique analyses
PWR	Pressurized Water Reactor
RCPB	Reactor coolant pressure boundary
RCS	Reactor Coolant System
RG	Regulatory guide
RPS	Reactor protection system
RT_{NDT}	nil-ductility transition reference temperature
RPV	Reactor Pressure Vessel
RW	Radwaste Systems

Acronym	Meaning
SBO	Station Blackout
SCC	Stress corrosion cracking
SSC	Systems Structures and Components
SR	Safety-Related
SRV	Safety Related Ventilation System
SSCs	Systems, structures, and components
SSE	Safe shutdown earthquake
TLAAs	Time-limited aging analyses
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate heat sink
USE	Upper-shelf energy

1.7 GENERAL REFERENCES

1.7.1 10 CFR 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants.”

1.7.2 NEI 95-10, “Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule,” Revision 6, June 2005.

1.7.3 Regulatory Guide 1.188, “Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses,” Revision 1.

1.7.4 NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants” United States Nuclear Regulatory Commission, Revision 2.

1.7.5 NUREG-1801, “Generic Aging Lessons Learned (GALL) Report,” United States Nuclear Regulatory Commission, Revision 2.

1.7.6 10 CFR 50.48, “Fire Protection.”

1.7.7 10 CFR 50.49, “Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants.”

1.7.8 10 CFR 50.62, “Requirements for Reduction of Risk from Anticipated Transients Without Scram (ATWS) Events for Light-Water-Cooled Nuclear Power Plants.”

1.7.9 10 CFR 50.63, “Loss of All Alternating Current Power.”

1.7.10 10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.”

1.7.11 10 CFR 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.”

1.7.12 10 CFR 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions.”

1.7.13 NUREG-0800, Section 9.5.1.1, Appendix B, “Supplemental Fire Protection Review Criteria for License Renewal,” Revision 5, March 2007.

1.7.14 NUREG-0933, “Resolution of Generic Safety Issues,” U.S. Nuclear Regulatory Commission, Supplement 34, December 2011.

1.7.15 EPRI Technical Report 1010639, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4.

1.7.16 Plant Support Engineering: License Renewal Electrical Handbook, Revision 1 to EPRI Report 1003057 (1013475), Final Report, February 2007.

1.7.17 “Plant Support Engineering: Aging Effects for Structures and Structural Components (Structural Tools),” EPRI, Final Report, December 2007, 1015078.

1.7.18 NEI 05-01, “Severe Accident Mitigation Alternatives (SAMA) Analysis Guidance Document, Revision A, November 2005.

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

This section describes the process for identifying structures and components subject to aging management review in the LaSalle County Station (LSCS) license renewal integrated plant assessment. For the systems, structures, and components (SSCs) within the scope of license renewal, 10 CFR 54.21(a)(1) requires the license renewal applicant to identify and list those structures and components subject to Aging Management Review (AMR). 10 CFR 54.21(a)(2) further requires that the methods used to implement the requirements of 10 CFR 54.21(a)(1) be described and justified. Section 2 of this application satisfies these requirements.

The process is performed in two steps. *Scoping* refers to the process of identifying the plant systems and structures that are to be included within the scope of license renewal in accordance with 10 CFR 54.4. The intended functions that are the bases for including the systems and structures within the scope of license renewal are also identified during the scoping process. *Screening* is the process of determining which components associated with the in scope systems and structures are subject to an aging management review in accordance with 10 CFR 54.21(a)(1) requirements. A detailed description of the LSCS scoping and screening process is provided in Section 2.1.

The scoping and screening methodology is consistent with the guidelines presented in NEI-95-10, Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule, Revision 6 (reference 1.7.2). The plant level scoping results identify the systems and structures within the scope of license renewal in Section 2.2. The screening results identify components subject to aging management review in the following LRA sections:

- Section 2.3 for mechanical systems
- Section 2.4 for structures and component supports
- Section 2.5 for electrical

2.1 SCOPING AND SCREENING METHODOLOGY

2.1.1 INTRODUCTION

This introduction provides an overview of the scoping and screening process used at LSCS. Subsequent sections provide details of how the process was implemented.

The initial step in the scoping process was to define the entire plant in terms of systems and structures. Each of these systems and structures were evaluated against the scoping criteria in 10 CFR 54.4(a)(1), (a)(2), and (a)(3), to determine if the system or structure performs or supports a safety-related intended function, if system or structure failure could prevent the satisfactory accomplishment of a safety-related function, or if the system or structure performs functions that demonstrate compliance with the requirement of one of the five license renewal regulated events. The intended function(s) that are the bases for including systems and structures within the scope of license renewal were also identified.

A mechanical system was included within the scope of license renewal if any portion of the system met the scoping criteria of 10 CFR 54.4. Mechanical systems determined to be within the scope of license renewal were then further evaluated to determine those system components that are required to perform or support the identified system intended function(s). The in scope boundaries of mechanical systems were identified and are described in Section 2.3. These boundaries are also depicted on the license renewal boundary drawings (LRBD) by the use of boundary flags which identify license renewal system interfaces. The in scope boundaries of the mechanical systems are highlighted in color. In scope mechanical components are shown highlighted in green or red. Mechanical components that are required to perform or support safety-related functions or are required to demonstrate compliance with one of the five license renewal regulated events are shown highlighted in green. Nonsafety-related mechanical components that are included within the scope of license renewal because they provide structural support to safety-related SSCs are shown highlighted in red. Nonsafety-related mechanical components that are included within the scope of license renewal because component failure could prevent the accomplishment of a safety-related function due to potential spatial interaction with safety-related SSCs are shown highlighted in red. Additional details on scoping evaluations and boundary drawing development are provided in Section 2.1.5.

A structure was included within the scope of license renewal if any portion of the structure met the scoping criteria of 10 CFR 54.4. Structures were then further evaluated to determine those structural components that are required to perform or support the identified structure intended function(s). The portions of each structure within the scope of license renewal that are required to perform or support the identified structure intended function(s) were identified and are described in Section 2.4. The structures that are within the scope of license renewal are highlighted in green on the site plan. Additional details on scoping evaluations and boundary drawing development are provided in Section 2.1.5.

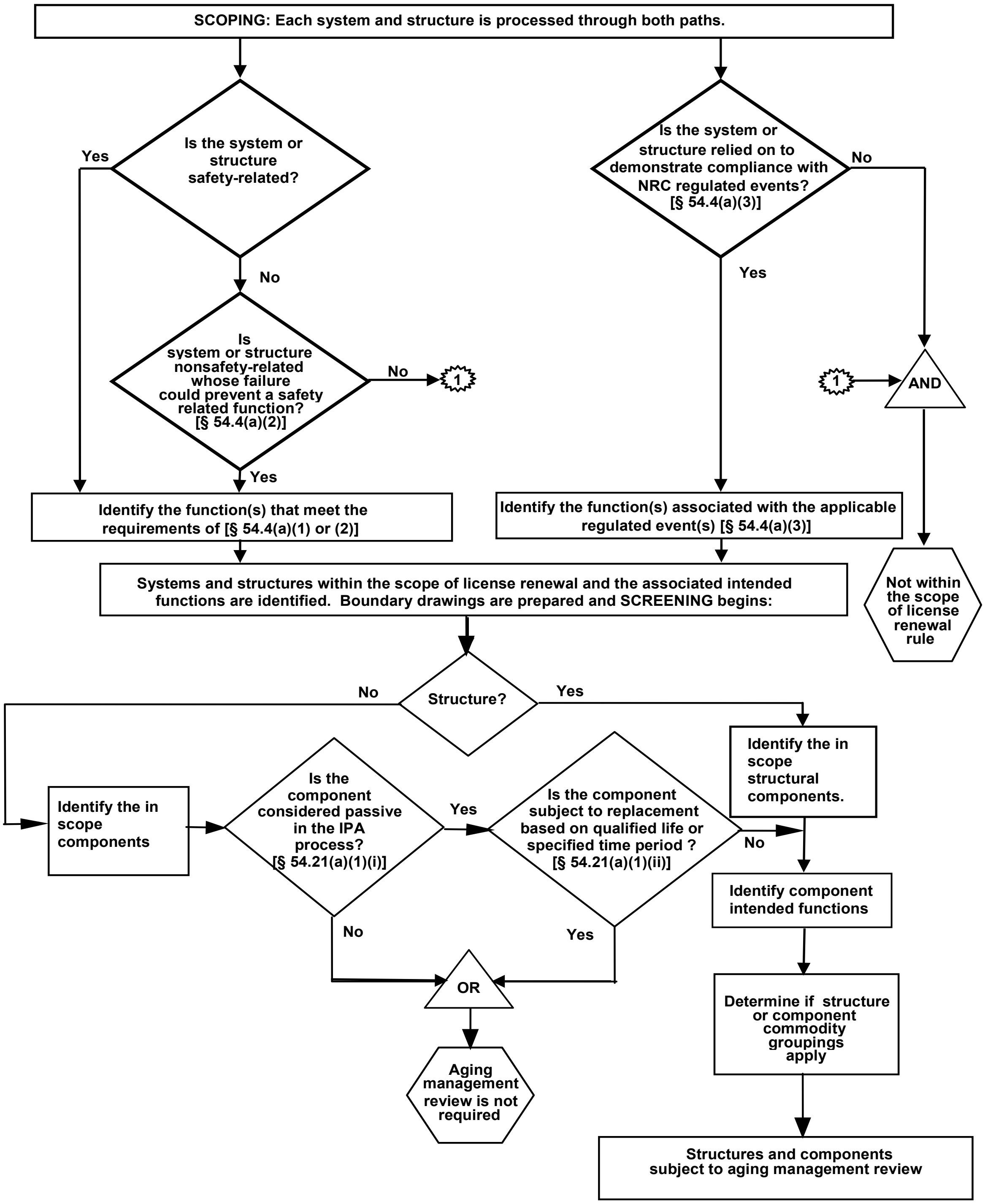
Electrical and Instrumentation and Control (I&C) systems were scoped like mechanical systems and structures per the scoping criteria in 10 CFR 54.4(a)(1), (a)(2), and (a)(3). Electrical and I&C components within the in scope electrical and I&C systems were included within the scope of license renewal. Likewise, electrical and I&C components within in scope mechanical systems were included within the scope of license renewal. Consequently, further system evaluations to determine which electrical components were required to perform or support the system intended functions were not performed during the scoping process. Additional details on electrical and I&C system scoping are provided in Section 2.1.5.

After completion of the scoping and boundary evaluations, the screening process was performed to evaluate the structures and components within the scope of license renewal to identify the long-lived and passive structures and components subject to an Aging Management Review (AMR). In addition, the passive intended functions of structures and components subject to AMR were identified. Additional details on the screening process are provided in Section 2.1.6.

Selected components, such as equipment supports, structural items (e.g., penetration seals, structural bolting, insulation), and passive electrical components, were scoped and screened as commodities. As such, they were not evaluated with the individual system or structure, but were evaluated collectively as a commodity group. Commodity groups are identified in Table 2.2-1. Passive structural commodities are identified in Section 2.4, and passive electrical commodities are identified in Section 2.5. Commodity groups utilized are consistent with NUREG-1800, Table 2.1-5, and previous license renewal applications accepted by the NRC.

Figure 2.1-1 provides a flowchart of the general scoping and screening process for mechanical systems, structures, and electrical systems.

Figure 2.1-1
LaSalle County Station Scoping and Screening Flowchart



2.1.2 INFORMATION SOURCES USED FOR SCOPING AND SCREENING

A number of different current licensing basis (CLB) and design basis information sources were utilized in the scoping and screening process. The CLB for LSCS is consistent with the definition provided in 10 CFR 54.4. The significant source documentation is discussed below.

These source documents are available in hard copy or electronic format. Document records such as licensing correspondence and NRC Safety Evaluation Reports are available in a searchable database, such that applicable documents can be identified and located by searching the appropriate topic.

2.1.2.1 Updated Final Safety Analysis Report

The LSCS UFSAR follows the established guidelines published in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," dated July 1981. The LSCS UFSAR has since been updated regularly in accordance with the requirements of 10 CFR 50.71(e). The UFSAR provided significant input for system and structure descriptions and functions.

2.1.2.2 Fire Protection Report

The Fire Protection Report (FPR) describes the fire protection configuration for the confinement, detection, and suppression of fires, and demonstrates the capability to achieve and maintain safe shutdown conditions in the event of a fire, in support of the Fire Protection Program functions.

2.1.2.3 Environmental Qualification Master List

The scope of the electrical equipment and components that must be environmentally qualified for use in a harsh environment at LSCS is identified in the Passport equipment database. The Passport equipment database is discussed in Section 2.1.2.6. The database includes a listing of equipment and components, and includes fields that identify specific equipment information such as manufacturer, plant location, and qualification level. The Passport equipment database Environmental Qualification (EQ) data field is a mandatory and design basis field, which means that the field must be populated and that the data is controlled and has been verified accurate.

2.1.2.4 Maintenance Rule Database

The Maintenance Rule Database documents the results of Maintenance Rule scoping for LSCS systems and structures. The Maintenance Rule Database provided an additional source of information to identify system and structure functions.

2.1.2.5 Engineering Drawings

Engineering drawings at LSCS provide system, structure, and component configuration details and safety classification information. These drawings were utilized to determine SSC functional requirements and materials of construction in support of scoping and screening evaluations.

2.1.2.6 Controlled Plant Component Database

LSCS maintains a controlled plant component database that contains component level design and maintenance information. The plant component database is called the Passport equipment database. The Passport equipment database lists plant components at the level of detail for which discrete maintenance or modification activities typically are performed. The Passport equipment database provides a comprehensive listing of plant components and their quality classifications. Unique equipment component tag numbers identify each component in the database.

2.1.2.7 Other CLB References

NRC Safety Evaluation Reports include NRC staff review of LSCS licensing submittals. Some of these documents may contain licensee commitments.

Licensing correspondence includes relief requests, Licensee Event Reports, and responses to NRC communications such as NRC bulletins, generic letters, or enforcement actions. Some of these documents may contain licensee commitments.

Engineering evaluations and calculations can provide additional information about the requirements or characteristics associated with the evaluated systems, structures, or components.

2.1.3 TECHNICAL BASIS DOCUMENTS

Technical basis documents were prepared in support of the license renewal project. Engineers experienced in nuclear plant systems, programs, and operations prepared the basis documents. Basis documents contain technical evaluations and bases for decisions or positions associated with license renewal requirements as described below. Basis documents are prepared, reviewed, and approved in accordance with controlled project procedures, and are based on the CLB source documents described in Section 2.1.2.

The following sections describe the technical basis documents associated with the LSCS scoping and screening methodology.

2.1.3.1 License Renewal Systems and Structures List

One of the first steps necessary to begin the license renewal scoping process was to identify a comprehensive list of systems and structures to be evaluated for license renewal scoping. While there exists a variety of document sources that identify and list systems and structures at LSCS, no single source provided the comprehensive list in a format appropriate for 10 CFR 54.4 license renewal system and structure scoping. Therefore, a basis document was prepared to establish a comprehensive list of license renewal systems and structures, and to document the basis for the list. Starting with the systems and structures list contained in the Passport equipment database, the list was evaluated against the LSCS UFSAR, plant design drawings, the maintenance rule database, and other plant CLB documents. Plant systems and structures were arranged into logical groupings for scoping reviews, and the groupings were defined as license renewal systems and structures. Components evaluated as commodity groups were also identified. The basis document assures all plant structures and components included in the scoping review are associated with a system, structure, or commodity group.

The basis document grouped license renewal systems and structures into the following categories:

- Reactor Vessel, Internals, and Reactor Coolant System
- Engineered Safety Features
- Auxiliary Systems
- Steam and Power Conversion System
- Electrical Components
- Structures and Component Supports

This grouping of the LSCS license renewal systems and structures is based on the LSCS UFSAR and the guidance of NUREG-1801 “Generic Aging Lessons Learned (GALL) Report,” Revision 2 (reference 1.7.5). The complete list of systems, structures, and commodity groups evaluated for license renewal is provided in Section 2.2 of this application.

Certain structures and equipment were excluded at the outset because they are not considered to be systems, structures, or components that are part of the CLB and do not have design or functional requirements related to the 10 CFR 54.4(a)(1), (a)(2), or (a)(3) scoping criteria. These include: driveways and parking lots, temporary equipment, health physics equipment, portable measuring and testing equipment, tools, and motor vehicles.

2.1.3.2 Identification of Safety-Related Systems and Structures

Safety-related systems and structures are included within the scope of license renewal in accordance with 10 CFR 54.4(a)(1) scoping criterion. LSCS plant systems and structures that have been designed to safety-related standards are identified in the UFSAR. LSCS plant components that have been classified as safety-related are identified as “SR” in the controlled safety classification data field in the Passport equipment database. LSCS safety classification procedures were reviewed against the license renewal “Safety-related” scoping criterion in 10 CFR 54.4(a)(1), to confirm that LSCS safety-related classifications are consistent with license renewal requirements. This review is included in a technical basis document. The basis document also provides a summary list of the systems and structures that are safety-related at LSCS.

These systems and structures are included within the scope of license renewal in accordance with the 10 CFR 54.4(a)(1) scoping criterion.

The LSCS UFSAR definition of safety-related is as follows:

Safety-related structures, systems, and components are those required to assure:

- *The integrity of the reactor coolant pressure boundary,*
- *The capability to shut down the reactor and maintain it in a safe shutdown condition, or*
- *The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures in excess of the guideline exposures of 10 CFR 100 or 10 CFR 50.67 as applicable.*

This definition is consistent with 10 CFR 54.4(a)(1) for the purposes of license renewal scoping. The wording differences are addressed as follows:

Design Basis Events

The LSCS UFSAR definition of safety-related does not specifically refer to design basis events, while 10 CFR 54.4(a)(1) refers to design basis events as defined in 10 CFR 50.49(b)(1). For LSCS license renewal, an additional technical basis document was prepared to confirm that all applicable design basis events were considered. The basis document includes a review of all systems or structures that are relied upon to remain functional during and following design-basis events as defined in 10 CFR 50.49 (b)(1). This includes confirming that design basis internal and external events including Design Basis Accidents (DBAs), Anticipated Operational Transients, Abnormal Operational Transients, and natural phenomena as described in the current licensing basis (CLB) are considered when scoping for license renewal. Safety-related systems and structures required to support 10 CFR 54.4(a)(1) functions are included within the scope of license renewal in accordance with 10 CFR 54.4(a)(1). Nonsafety-related systems and structures required to support 10 CFR 54.4(a)(1) functions are included within the scope of license renewal in accordance with 10 CFR 54.4(a)(2).

Exposure Limits

The license renewal rule refers to exposure limits as defined in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable. These different exposure limit requirements appear in three different Code sections to address similar accident analyses performed by licensees for different reasons. The exposure limit requirements in 10 CFR 50.34(a)(1) are applicable to facilities seeking a construction permit, and are, therefore, not applicable to LSCS license renewal. The exposure limit requirements in 10 CFR 50.67(b)(2) are applicable to facilities seeking to revise the current accident source term used in their design basis radiological analyses.

The original UFSAR Chapter 15 Accident Analyses were performed to address 10 CFR 100 guidelines. In support of a full scope implementation of Alternative Source Term (AST) methodology in accordance with Regulatory Guide 1.183, AST radiological consequence analyses were performed for the design basis accidents that result in offsite exposures. The Loss-of-Coolant Accident and the Fuel Handling Accident were analyzed. The dose consequences for these limiting design basis accidents result in doses that are within the guidelines of 10 CFR 50.67. The AST analytical methods described in Regulatory Guide 1.183 and dose limits defined in 10 CFR 50.67 comprise the design basis for the LaSalle design basis accidents.

When supplemented with the broad review of CLB design basis events, the LSCS UFSAR definition of “safety-related" is consistent with 10 CFR 54.4(a)(1), and results in a comprehensive list of safety-related systems and structures that were included within the scope of license renewal. This is consistent with NUREG-1800 Section 2.1.3.1.1. Additional detail on the application of the 10 CFR 54.4(a)(1) scoping criterion is provided in Section 2.1.5.1.

2.1.3.3 10 CFR 54.4(a)(2) Scoping Criteria

All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1), were included within the scope of license renewal in accordance with 10 CFR 54.4(a)(2) requirements. To assure complete and consistent application of this scoping criterion, a technical basis document was prepared.

This license renewal scoping criteria requires consideration of the following:

1. Nonsafety-related SSCs required to provide functional support for a safety-related 10 CFR 54.4(a)(1) function.

2. Nonsafety-related systems connected to and providing structural support for a safety-related SSC.

3. Nonsafety-related systems with a potential for spatial interaction with safety-related SSCs.

The first item is addressed during the scoping process, by identifying the nonsafety-related systems and structures required to functionally support the accomplishment of a safety-related intended function under 10 CFR 54.4(a)(1), and then including these supporting systems and structures in scope of license renewal under 10 CFR 54.4(a)(2).

The remaining two items concern nonsafety-related systems with potential physical or spatial interaction with safety-related systems, structures, and components. Scoping of these systems is the subject of NEI 95-10, Appendix F. To assure complete and consistent application of 10 CFR 54.4(a)(2) requirements and NEI 95-10, a technical basis document was prepared. The basis document includes a review of the CLB references relevant to physical or spatial interactions.

The basis document describes the LSCS approach to scoping of nonsafety-related systems with a potential for physical or spatial interaction with safety-related SSCs. The basis document provides appropriate guidance to assure that license renewal scoping for 10 CFR 54.4(a)(2) met the requirements of the license renewal rule and NEI 95-10. Additional detail on the application of the 10 CFR 54.4(a)(2) scoping criterion is provided in Section 2.1.5.2.

2.1.3.4 Scoping for Regulated Events

Technical basis documents were prepared to address license renewal scoping of SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection, Environmental Qualification, Anticipated Transients Without Scram, and Station Blackout. The Commission's regulations for pressurized thermal shock are not applicable to the LSCS boiling water reactor design. These basis documents are summarized below:

Fire Protection

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) are included within the scope of license renewal in accordance with 10 CFR 54.4(a)(3) requirements.

The scope of systems and structures required for the fire protection program to comply with the requirements of 10 CFR 50.48 includes:

- Systems and structures required to demonstrate post-fire safe shutdown capabilities
- Systems and structures required for fire protection (detection, suppression, and barriers)

NRC guidance, including NUREG-0800 Section 9.5.1, Appendix B (reference 1.7.13) states that the scope of 10 CFR 50.48 goes beyond the protection of safety-related equipment, and also includes fire protection systems, structures, and components needed to minimize the effects of a fire and to prevent the release of radioactive material to the environment. Fire protection system and structure scoping for LSCS is performed consistent with this guidance, and is documented in the technical basis document.

The fire protection technical basis document summarizes results of a detailed review of the plant's fire protection program documents that demonstrate compliance with the requirements of 10 CFR 50.48. The basis document provides a list of systems and structures credited in the plant's fire protection program documents. For the listed systems and structures, the basis document also identifies appropriate CLB references. The identified systems and structures are included within the scope of license renewal in accordance with 10 CFR 54.4(a)(3) scoping criteria.

The fire detection and suppression systems at LSCS are plant-wide systems that protect a wide variety of plant equipment. Not all portions of these systems are required to demonstrate compliance with 10 CFR 50.48. Some portions of the fire detection and suppression systems protect plant areas in which a fire would not impact any equipment important to safety or significantly increase the risk of radioactive releases to the environment. Portions of the fire suppression and detection systems are not included within the scope of license renewal if (1) those portions of the system are provided to protect areas that do not contain any SSCs within the scope of license renewal and (2) those portions of the system can be isolated from the in scope portions of the system. The portions of the fire suppression and detection systems that are not included within the scope of license renewal are identified in the system scoping document. Those portions of fire detection and suppression systems that are not included in scope can be isolated from the remaining in scope system by closing the associated isolation valve. The isolation valve is included within the scope of license renewal.

Environmental Qualification

Criterion 10 CFR 54.4(a)(3) requires that 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 environmental qualification (10 CFR 50.49) be included within the scope of license renewal.

The LSCS Environmental Qualification (EQ) program includes 1) safety-related electrical equipment, 2) nonsafety-related electrical equipment whose failure under postulated environmental conditions could prevent the accomplishment of safety functions, and 3) certain post-accident monitoring equipment, as defined in 10 CFR 50.49(b)(1), 10 CFR 50.49(b)(2), and 10 CFR 50.49(b)(3) respectively. This equipment is included within the scope of license renewal.

The environmental qualification basis document summarizes the results of a review of LSCS EQ program documents. The EQ basis document provides a list of systems that include EQ components. The EQ basis document also provides a list of structures that provide the physical boundaries for the postulated harsh environments, and contain environmentally qualified electrical equipment. These systems and structures are included within the scope of license renewal in accordance with 10 CFR 54.4(a)(3) scoping criteria.

Anticipated Transients Without Scram

Criterion 10 CFR 54.4(a)(3) requires that 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 anticipated transients without scram (10 CFR 50.62) be included within the scope of license renewal.

An Anticipated Transient Without Scram (ATWS) is an anticipated operational occurrence that generates an automatic scram signal, accompanied by a failure of the reactor protection system to automatically shutdown the reactor. The ATWS rule (10 CFR 50.62) requires improvements in the design and operation of light-water cooled water reactors to reduce the likelihood of failure to automatically shutdown the reactor, and to mitigate the consequences of an ATWS event. LSCS Unit 1 and Unit 2 are boiling water reactors. For boiling water reactors (BWR), the following requirements apply:

1. Each BWR must have an alternate rod injection (ARI) system with redundant scram air header exhaust valves. The ARI system must be independent of the existing reactor trip system.

2. Each BWR must have a standby liquid control system with defined boron injection capabilities. Standby liquid control system automatic initiation is not required for plants issued a construction permit before July 26, 1984, unless already installed.

3. Each BWR must have equipment to trip the recirculation pumps automatically under conditions indicative of an ATWS.

The ATWS basis document summarizes the results of a review of the LSCS current licensing basis with respect to ATWS. The LSCS design features to meet the requirements of 10 CFR 50.62 for ATWS mitigation include:

- Alternate Rod Insertion (ARI) system features to satisfy the requirements of 10 CFR 50.62 (c)(3). The ARI plant system is included in the License Renewal Reactivity Control system.

- Standby Liquid Control (SLC) system to meet the requirements of 10 CFR 50.62 (c)(4).

- ATWS Recirculation Pump Trip (RPT) system to satisfy the requirements of 10 CFR 50.62 (c)(5).

The ATWS basis document provides a list of the systems required by 10 CFR 50.62 to reduce the risk from ATWS events. The basis document also provides a list of structures that provide physical support and protection for the ATWS systems. These systems and structures are included within the scope of license renewal in accordance with 10 CFR 54.4(a)(3) scoping criteria.

Station Blackout

Criterion 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 demonstrates compliance with the Commission’s regulations for station blackout (10 CFR 50.63) be included within the scope of license renewal.

A station blackout (SBO) event is a complete loss of alternating current (AC) electric power to the essential and nonessential switchgear buses in a nuclear power plant (i.e., loss of the offsite electric power system concurrent with generator trip and unavailability of the onsite emergency AC power sources). SBO does not include the loss of available AC power to buses fed by station batteries through inverters or by alternate AC sources, nor does it assume a concurrent single failure or design basis accident.

LSCS satisfies the requirement of 10 CFR 50.63 as an AC-independent, 4-hour coping plant. LSCS capabilities, commitments and analyses that demonstrate compliance with 10 CFR 50.63 are documented in the UFSAR Section 15.9 and in NRC safety evaluation reports and correspondence related to the SBO rule.

The NUREG-1800 guidance on scoping of equipment relied on to meet the requirements of the SBO rule (10 CFR 50.63) for license renewal has been incorporated into the LSCS scoping methodology. In accordance with the NUREG-1800 requirements, the SSCs required to recover from the SBO event are included within the scope of license renewal. Recovery is defined as the repowering of the plant AC distribution system from offsite sources or onsite emergency AC sources.

For LSCS, the boundary between the offsite transmission system and the plant electrical distribution system has been defined at four 345 kV switchyard circuit breakers: breakers 1-13 and 11-13 for the input to system auxiliary transformer 142 and breakers 1-6 and 4-6 for the input to system auxiliary transformer 242. This boundary is consistent with the NRC standard review plan for license renewal, NUREG-1800, section 2.5.2.1.1 for the boundary for the Station Blackout recovery path. The NUREG states that the in scope plant system portion of the offsite power system that is used to connect to the offsite power source is the equipment out to the first circuit breaker with the offsite distribution system. This typically includes equipment in the switchyard. The breaker control circuits and the structures associated with these breakers and the switchyard relay house are also in scope for license renewal. See Figure 2.1-2 for the LSCS SBO recovery path boundary.

Figure 2.1-2 also shows LSCS connections to the 345 kV transmission system. The 345 kV transmission system via the LSCS 345 kV switchyard is the preferred (and alternate for Division 1 and Division 2) power sources for LSCS safety-related loads. Two physically independent circuits are provided for each unit, one via the unit’s assigned system auxiliary transformer, and the other from the system auxiliary transformer of the other unit. The system auxiliary transformers step the 345 kV voltage down to 4160 V for the safety-related 4160 V switchgear and associated downstream safety-related loads. As an example, the 4160 V safety-related switchgear source power paths from the normal offsite source from the 345 kV transmission system, and, from the alternate offsite source from the 345 kV transmission system are described below using the safety-related 4160 V 142Y (1A) switchgear as an example.

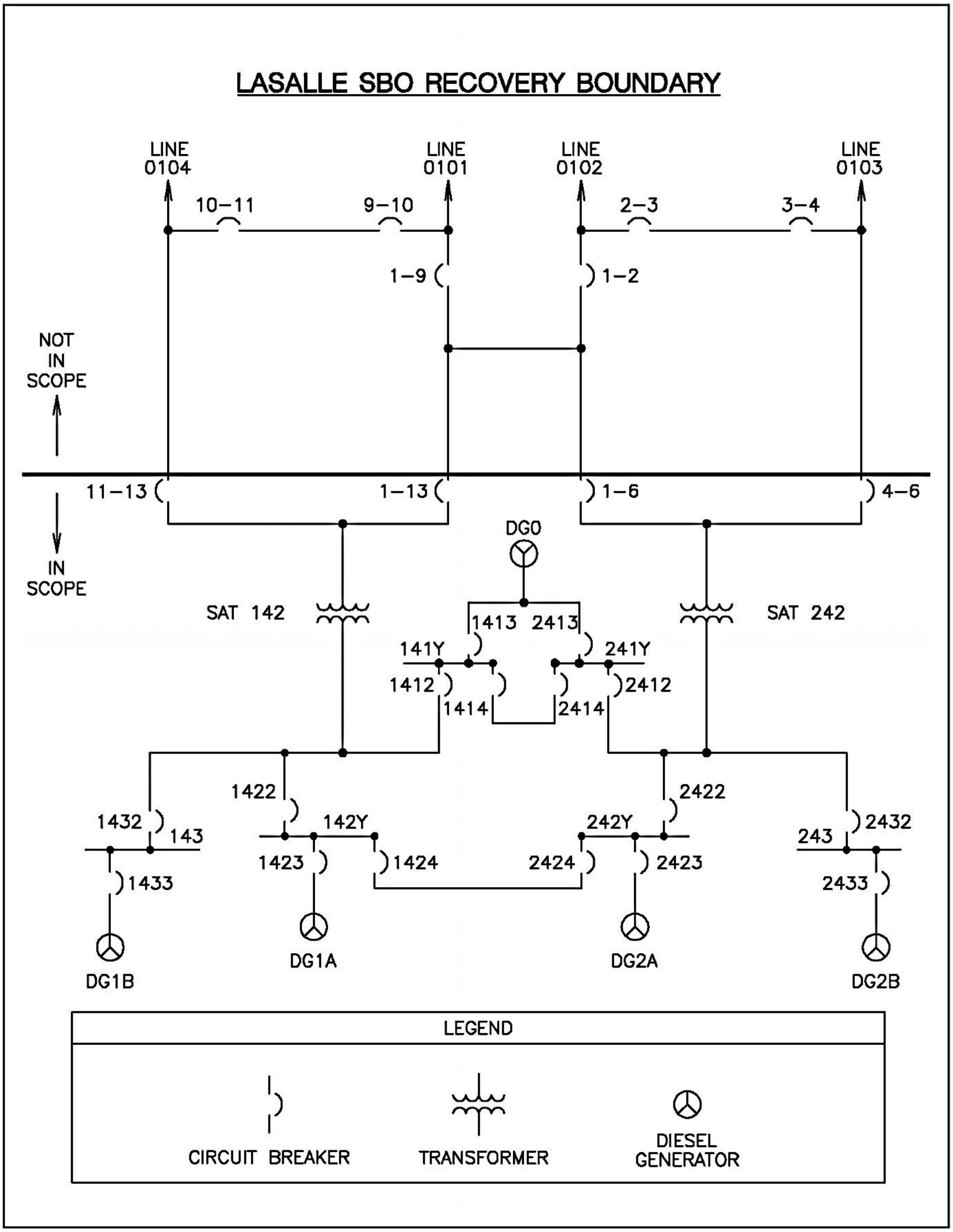
- The normal offsite source from the 345 kV system is through the Unit 1 System Auxiliary Transformer 142 and then through breaker 1422 to energize the safety-related 4160 V 142Y (1A) switchgear.

- The alternate offsite source from the 345 kV system is through the Unit 2 System Auxiliary Transformer 242 and then through breakers 2422, 2424 and 1424 to energize the 4160 V safety-related 142Y (1A) switchgear.

The power paths for the remaining Division 1 and Division 2 LSCS safety-related 4160 V switchgear are similar.

The SBO basis document summarizes the results of a review of the LSCS current licensing basis with respect to station blackout. The basis document provides lists of systems and structures credited in LSCS SBO evaluations. For the listed systems and structures, the basis document also identifies appropriate CLB references. These systems and structures are included within the scope of license renewal in accordance with 10 CFR 54.4(a)(3) scoping criteria.

Figure 2.1-2


LASALLE SBO RECOVERY BOUNDARY
LINE 0104
LINE 0101
LINE 0102
LINE 0103
10-11
9-10
2-3
3-4
1-9
1-2
NOT IN SCOPE
IN SCOPE
11-13
1-13
1-6
4-6
DG0
SAT 142
SAT 242
1413
2413
141Y
241Y
1412
1414
2414
2412
1422
2422
1432
143
142Y
242Y
2432
243
1423
1424
2424
2423
1433
2433
DG1B
DG1A
DG2A
DG2B
LEGEND
CIRCUIT BREAKER
TRANSFORMER
DIESEL GENERATOR

2.1.4 INTERIM STAFF GUIDANCE DISCUSSION

The NRC has encouraged applicants for license renewal to address Interim Staff Guidance (ISG) issues in license renewal applications. The following is a listing of ISGs reviewed that have not been incorporated in NUREG-1800 or NUREG-1801 as of October 2014.

LR-ISG-2006-03	Staff Guidance for Preparing Severe Accident Mitigation Alternatives Analyses
LR-ISG-2011-01	Aging Management of Stainless Steel Structures and Components in Treated Borated Water, Revision 1
LR-ISG-2011-02	Aging Management Program for Steam Generators
LR-ISG-2011-03	Generic Aging Lessons Learned (GALL) Report Revision 2 AMP XI.M41, “Buried and Underground Piping and Tanks”
LR-ISG-2011-04	Updated Aging Management Criteria for Reactor Vessel Internal Components of Pressurized Water Reactors
LR-ISG-2011-05	Ongoing Review of Operating Experience
LR-ISG-2012-01	Wall Thinning Due to Erosion Mechanisms
LR-ISG-2012-02	Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation
Draft LR-ISG-2013-01	Aging Management of Loss of Coating Integrity for Internal Service Level III (Augmented) Coatings

The following sections provide summaries of how each of the ISG issues is addressed in the LSCS LRA:

2.1.4.1 Staff Guidance for Preparing Severe Accident Mitigation Alternatives Analyses (LR-ISG-2006-03)

This LR-ISG provides interim guidance to applicants for license renewal in which the NRC endorses the guidance of NEI 05-01, “Severe Accident Mitigation Alternatives (SAMA) Analysis Guidance Document” (reference 1.7.18). The LSCS severe accident mitigation alternatives analysis provided as a part of Appendix E to this application is consistent with the guidance of NEI 05-01, as discussed in this LR-ISG.

2.1.4.2 Aging Management of Stainless Steel Structures and Components in Treated Borated Water, Revision 1 (LR-ISG-2011-01)

This LR-ISG provides interim guidance to applicants for license renewal as to one acceptable approach to managing the aging effects of stainless steel structures and components exposed to treated borated water. New guidance has also been provided for BWR spent fuel storage racks for which there is currently no specific guidance in the GALL Report for the loss of material aging effect. LSCS incorporates the guidance presented in this LR-ISG for BWRs and utilizes the One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program to manage loss of material of stainless steel control rod blades, defective fuel, and spent fuel storage racks exposed to treated water in the Fuel Pool Cooling and Storage System. Results are provided in Section 3, Aging Management Review Results.

2.1.4.3 Aging Management Program for Steam Generators (LR-ISG-2011-02)

This guidance does not apply to LSCS which is a boiling water reactor.

2.1.4.4 Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2 AMP XI.M41, "Buried and Underground Piping and Tanks" (LR-ISG-2011-03)

This LR-ISG provides interim guidance to applicants for license renewal as to one acceptable approach to managing the aging effects of buried and underground piping and tanks within the scope of license renewal. LR-ISG-2011-03 revises the guidance provided in NUREG-1801, Revision 2, XI.M41, "Buried and Underground Piping and Tanks" program. The LSCS Selective Leaching (B.2.1.22) program, External Surfaces Monitoring of Mechanical Components (B.2.1.24) program, and Buried and Underground Piping (B.2.1.28) program incorporate the guidance presented in this LR-ISG.

2.1.4.5 Updated Aging Management Criteria for Reactor Vessel Internal Components of Pressurized Water Reactors (LR-ISG-2011-04)

This guidance does not apply to LSCS which is a boiling water reactor.

2.1.4.6 Ongoing Review of Operating Experience (LR-ISG-2011-05)

This LR-ISG provides interim guidance to applicants for license renewal revising NUREG-1800 acceptance criteria and review procedures to better address the ongoing review of operating experience with respect to license renewal aging management programs. The LSCS license renewal application incorporates the guidance presented in this LR-ISG. Ongoing review of operating experience is addressed in Appendix A, Section A.1.6 and Appendix B, Section B.1.4.

2.1.4.7 Wall Thinning Due to Erosion Mechanisms (LR-ISG-2012-01)

This LR-ISG provides interim guidance to applicants for license renewal as to one acceptable approach to managing the aging effect of wall thinning due to various erosion mechanisms in piping and components within the scope of license renewal. LR-ISG-2012-01 revises the guidance provided in NUREG-1801, Revision 2, XI.M17, "Flow-Accelerated Corrosion" program. The LSCS Flow-Accelerated Corrosion (B.2.1.10) program incorporates the guidance presented in this LR-ISG.

2.1.4.8 Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation (LR-ISG-2012-02)

This LR-ISG provides interim guidance to applicants for license renewal as to one acceptable approach to managing the effects of aging. The ISG addresses recurring internal corrosion, representative minimum sample size for internal inspections, fire water system blockage, revised scope and inspection for tanks, corrosion under insulation, volumetric examination of underground piping, and pressurization of elastomers. The LSCS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program, Fire Water System (B.2.1.17) program, Aboveground Metallic Tanks (B.2.1.18) program, External Surfaces Monitoring of Mechanical Components (B.2.1.24) program, Open-Cycle Cooling Water System (B.2.1.12) program, Selective Leaching (B.2.1.22) program and Closed Treated Water Systems (B.2.1.13) program incorporate the guidance presented in this LR-ISG.

2.1.4.9 Aging Management of Loss of Coating Integrity for Internal Service Level III (Augmented) Coatings (Draft LR-ISG-2013-01; ADAMS Accession No. ML13262A442)

This draft LR-ISG provides interim guidance to applicants for license renewal as to one acceptable approach to managing loss of coating integrity due to blistering, cracking, flaking, peeling, or physical damage of Service Level III (augmented) coatings. Draft LR-ISG-2013-01 provides for a new NUREG-1801 aging management program for Service Level III (augmented) coatings. LSCS will implement a Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) plant-specific program for managing the loss of coating integrity in Service Level III (augmented) coatings which incorporates the guidance presented in this draft LR-ISG.

2.1.5 SCOPING PROCEDURE

The scoping process is the systematic process used to identify the LSCS systems, structures, and components within the scope of the license renewal rule. The scoping process was initially performed at the system and structure level, in accordance with the scoping criteria identified in 10 CFR 54.4(a). System and structure functions and intended functions were identified from a review of the source CLB documents. In scope boundaries were established and documented in the scoping evaluations, based on the identified intended functions. The in scope boundaries form the basis for identification of the in scope components, which is the first step in the screening process described in Section 2.1.6. System and structure scoping evaluations are documented and have been retained in a license renewal database. The system and structure scoping results are provided in Section 2.2.

The LSCS scoping process began with the development of a comprehensive list of plant systems and structures, as described in Section 2.1.3.1. The systems and structures were grouped into one of the following categories:

- Reactor Vessel, Internals, and Reactor Coolant System
- Engineered Safety Features
- Auxiliary Systems
- Steam and Power Conversion System
- Structures and Component Supports
- Electrical Components

Each LSCS system and structure was then scoped for license renewal using the criteria of 10 CFR 54.4(a). These criteria are briefly identified as follows:

- Title 10 CFR 54.4(a)(1) – Safety-Related
- Title 10 CFR 54.4(a)(2) – Nonsafety-Related affecting safety-related
- Title 10 CFR 54.4(a)(3) – Regulated Events:
  - Fire Protection (10 CFR 50.48)
  - Environmental Qualification, EQ (10 CFR 50.49)
  - Pressurized Thermal Shock (10 CFR 50.61) (PWRs only)
  - Anticipated Transient Without Scram, ATWS (10 CFR 50.62)
  - Station Blackout, SBO (10 CFR 50.63)

The application of each of these criteria is discussed in Section 2.1.5.1, Section 2.1.5.2, and Section 2.1.5.3 below:

2.1.5.1 <u>Safety-Related – 10 CFR 54.4(a)(1)</u>

In accordance with 10 CFR 54.4(a)(1), the systems, structures, and components within the scope of license renewal include:

> *Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions –*
>
> *(i) The integrity of the reactor coolant pressure boundary;*
>
> *(ii) The capability to shutdown the reactor and maintain it in a safe shutdown condition; or*
>
> *(iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable.*

At LSCS, the safety-related plant components are identified in controlled engineering drawings and summarized in the Passport equipment database. The safety-related classifications in the LSCS Passport equipment database were populated using a controlled procedure, with classification criteria consistent with the above 10 CFR 54.4(a)(1) criteria. The classification criteria differences have been evaluated in a license renewal basis document as described in Section 2.1.3.2 and accounted for during the license renewal scoping process.

Safety-related classifications for systems and structures are based on system and structure descriptions and analyses in the UFSAR, or on design basis documents such as engineering drawings, design specifications, evaluations, or calculations. Safety-related structures are those structures listed in the UFSAR and classified as Seismic Category I. Systems and structures that are identified as safety-related in the UFSAR or in design basis documents have been classified as satisfying the criteria of 10 CFR 54.4(a)(1) and have been included within the scope of license renewal. Safety-related components listed in the Passport equipment database were also reviewed and the system or structure associated with the safety-related component was included within the scope of license renewal in accordance with 10 CFR 54.4(a)(1) criteria. The review also confirmed that plant conditions, internal and external events including design basis accidents (DBAs), anticipated operational transients, abnormal operational transients, and natural phenomena as described in the current licensing basis (CLB), were considered for license renewal scoping.

2.1.5.2 Nonsafety-Related Affecting Safety-Related – 10 CFR 54.4(a)(2)

In accordance with 10 CFR 54.4(a)(2), the systems, structures, and components within the scope of license renewal include:

- All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1)(i), (ii), or (iii).

This scoping criterion requires an assessment of nonsafety-related SSCs with respect to the following application or configuration categories:

- Functional support for safety-related SSC 10 CFR 54.4(a)(1) functions
- Connected to and provide structural support for safety-related SSCs
- Potential for spatial interactions with safety-related SSCs

Each of these three categories is discussed below:

Functional Support for Safety-Related SSC 10 CFR 54.4(a)(1) Functions

This category addresses nonsafety-related SSCs that are required to function in support of a safety-related SSC intended function. The functional requirement distinguishes this category from the other categories, where the nonsafety-related SSCs are required only to maintain adequate integrity to preclude structural failure or spatial interactions. The nonsafety-related SSCs that were included within the scope of license renewal to support a safety-related SSC in performing a 10 CFR 54.4(a)(1) intended function are identified on the license renewal boundary drawings in green.

The LSCS UFSAR and other CLB documents were reviewed to identify nonsafety-related systems or structures required to support satisfactory accomplishment of a safety-related function. Nonsafety-related systems or structures credited in CLB documents to support a safety-related function have been included within the scope of license renewal. LSCS classifies systems that are required to perform or support a safety-related function as safety-related, with the following exceptions:

- The Area Radiation Monitoring System includes nonsafety-related SSCs that are functionally relied upon to directly mitigate the consequences of the radwaste gas leak abnormal operational transient.

- The Condenser and Air Removal System includes the nonsafety-related main condenser which is credited for holdup and plateout of MSIV leakage following a LOCA. Additionally, manual isolation of the nonsafety-related main condenser off-gas outlet valves and manual tripping of the nonsafety-related mechanical vacuum pump is credited following a control rod drop accident to minimize radioactive releases.

- The Cranes, Hoists and Refueling Equipment System includes nonsafety-related cranes, hoists and refueling equipment that provide a safe means for handling loads above or near safety-related components.

- The Main Steam System includes nonsafety-related SSCs that contain leakage from the MSIVs and routes the leakage to the main condenser for holdup and plateout prior to release following a LOCA.

- Main Turbine and Auxiliaries System includes the nonsafety-related low pressure turbine exhaust hoods which are credited for holdup and plateout of MSIV leakage following a LOCA.

- The Plant Computer System includes nonsafety-related SSCs that are functionally relied upon to support operator actions that mitigate the consequences of analyzed accidents as presented in the UFSAR Accident Analyses, including abnormal operating transients.

- The Plant Drainage System includes nonsafety-related floor drains in the Reactor Building that are credited for the mitigation of flooding as a result of a high energy line break (HELB) or a moderate energy line break (MELB) in the Reactor Building. Additionally, the nonsafety-related drywell drain lines that are routed through the suppression chamber airspace prior to exiting the primary containment are in scope to ensure their pressure boundary integrity to prevent drywell to suppression chamber bypass leakage.

- The Process Radiation Monitoring System includes the nonsafety-related station vent stack wide range radiation monitor which is credited to sense process conditions and generate signals to actuate control room alarms to prompt operator actions in response to a radwaste gas leak abnormal operational transient.

- The Reactivity Control System includes the nonsafety-related rod worth minimizer which is credited to prevent rod withdrawal error at low power. Additionally, the rod worth minimizer is credited for a control rod drop accident.

- The Safety-Related Ventilation System includes nonsafety-related SSCs that provide a pathway to the station vent stack for the potential release of fission products following certain abnormal operational transients.

These nonsafety-related systems, nonsafety-related portions of safety-related systems, and structures were included within the scope of license renewal in accordance with 10 CFR 54.4(a)(2).

As an additional confirmation of scoping to meet 10 CFR 54.4(a)(2) criteria, a supporting system review was completed as part of the scoping process. The scoping process was performed on a system and structure basis. For systems included within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(1), the scoping evaluation included the identification of any additional systems, including nonsafety-related systems, that are required to support the safety-related system intended functions. It was then confirmed that these identified supporting systems were also included in scope. Except as identified above, the LSCS systems required to support 10 CFR 54.4(a)(1) functions are classified safety-related, and as such included within the scope of license renewal in accordance with 10 CFR 54.4(a)(1). The identification of supporting systems was not required for structures since structural intended functions do not rely on supporting systems.

The next three 10 CFR 54.4(a)(2) scoping categories are the subject of NEI 95-10, Appendix F. The guidance requires that, when demonstrating that failures of nonsafety-related systems would not adversely impact the ability to maintain intended functions, a distinction must be made between nonsafety-related systems that are directly connected to safety-related systems and those that are not directly connected to safety-related systems. For a nonsafety-related piping system that is directly connected to and provides structural support for a safety-related piping system, the nonsafety-related piping and supports shall be included within the scope of license renewal up to (1) the analytical boundary defined in the CLB seismic analysis for the safety-related piping or, (2) if the seismic boundary is not clearly defined in the CLB information, up to the point beyond which the failure of the nonsafety-related piping will not render the safety-related portion of the piping system unable to perform its intended function under CLB design conditions. The location of the point beyond which the failure of the nonsafety-related piping will not render the safety-related portion of the piping system unable to perform its intended function under CLB design conditions is identified using the guidance presented in NEI 95-10, Appendix F, Section 4.

For nonsafety-related systems which are not connected to safety-related piping or components, or are outside the structural support boundary for the attached safety-related piping system, but have a spatial relationship such that their failure could adversely impact the performance of a safety-related SSC's intended function, there are two scoping options: a mitigative option or a preventive option. When mitigative features (e.g., pipe whip restraints, jet impingement shields, spray and drip shields, seismic supports, flood barriers, and physical barriers such as floors, walls, and doors) are provided to protect safety-related SSCs from failures of nonsafety-related SSCs, this demonstration should show that mitigating devices are adequate to protect safety-related SSCs from failures of nonsafety-related SSCs regardless of failure location. If this level of protection can be demonstrated, then only the mitigative features need to be included within the scope of license renewal. However, if it cannot be demonstrated that the mitigative features are adequate to protect safety-related SSCs from the consequences of failures of nonsafety-related SSCs, then the preventive option is used, which requires that the nonsafety-related SSC be brought into the scope of license renewal.

The methodology for identification of LSCS SSCs that satisfy the 10 CFR 54.4(a)(2) scoping criterion was based on a review of applicable CLB documents, as well as plant-specific and industry operating experience. The mitigative and preventive options are both used to demonstrate that safety-related SSCs are adequately protected from failure of nonsafety-related SSCs.

Connected to and Provide Structural Support for Safety-Related SSCs

For nonsafety-related SSCs directly connected to safety-related SSCs the nonsafety-related piping and supports, up to and including the first seismic or equivalent anchor (such as a series of supports that have been evaluated as a part of a plant-specific piping design analysis to ensure that forces and moments are restrained in three (3) orthogonal directions) beyond the safety/nonsafety interface, are within the scope of license renewal per 10 CFR 54.4(a)(2). The "first seismic or equivalent anchor" is defined such that the failure in the nonsafety-related pipe run beyond the first seismic or equivalent anchor will not render the safety-related portion of the piping unable to perform its intended function under CLB design conditions.

An alternative to specifically identifying a seismic anchor or equivalent anchor that supports the safety-related/nonsafety-related piping interface is to include enough of the nonsafety-related piping run to ensure these anchors are included and thereby ensure the piping and anchor intended functions are maintained. The intended function consists of two facets 1) providing structural support for the safety-related/nonsafety-related interface and 2) ensuring nonsafety-related piping loads are not transferred through the safety-related/nonsafety-related interface. The following methods (a) thru (g) were used to define end points for the portion of nonsafety-related piping attached to safety-related piping to be included in the scope of license renewal. In these cases the nonsafety-related piping was included in scope for 10 CFR 54.4(a)(2) up to one of the following:

a) A combination of restraints or supports that encompasses at least two (2) supports in each of three (3) orthogonal directions.

b) A base-mounted component (e.g., pump, heat exchanger, tank, etc.) that is a rugged component and is designed not to impose loads on connecting piping. The license renewal scope includes the base-mounted component as it has a support function for the safety-related piping.

c) A flexible connection that 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).

d) A free end of nonsafety-related piping, such as a drain pipe that ends at an open floor drain.

e) For nonsafety-related piping runs that are connected at both ends to safety-related piping, the entire run of nonsafety-related piping is included in scope.

f) A point where buried piping exits the ground. The buried portion of the piping should be included in the scope of license renewal. A determination that the buried piping is well founded on compacted soil that is not susceptible to liquefaction must be documented.

g) A smaller branch line where the moment of inertia ratio of the larger piping to the smaller piping is equal to or greater than the acceptable ratio defined by the current licensing basis, because significantly smaller piping does not impose loads on larger piping and does not support larger piping.

These scoping boundaries are determined from review of the physical installation details, design drawings, or seismic analysis calculations.

Failure in the nonsafety-related piping beyond the above anchor locations would not impact structural support for the safety-related piping. The associated piping and components included within the scope of license renewal are identified on the license renewal boundary drawings in red. Symbols identifying the anchor locations and the seismic analysis boundaries that define the structural support boundary for safety-related piping systems are shown on the license renewal boundary drawings in blue. Note that if the connected nonsafety-related piping system contains water, steam or oil, then the in scope boundary may extend beyond the locations described above due to potential for spatial interaction with safety-related SSCs.

Potential for Spatial Interactions with Safety-Related SSCs

Nonsafety-related systems that are not connected to safety-related piping or components, or are outside the structural support boundary for the attached safety-related piping system, and have a spatial relationship such that their failure could adversely impact the performance of a safety-related SSC intended function, must be evaluated for license renewal scope in accordance with 10 CFR 54.4(a)(2) requirements. As described in NEI 95-10, Appendix F, there are two options when performing this scoping evaluation: a mitigative option and a preventive option.

The mitigative option involves crediting plant mitigative features to protect safety-related SSCs from failures of nonsafety-related SSCs. Examples of plant mitigative features include pipe whip restraints, jet impingement shields, spray and drip shields, seismic supports, flood barriers, and physical barriers (e.g., floors, walls, doors). This option requires a demonstration that the mitigating features are adequate to protect safety-related SSCs from failures of nonsafety-related SSCs regardless of failure location. If this level of protection can be demonstrated, then only the mitigative features need be included within the scope of license renewal. Mitigative plant design features are used in the Turbine Building and Offgas Building to exclude SSCs from the scope of license renewal at LSCS by defining the boundaries for areas where spatial interaction is not a concern.

The preventive option involves identifying the nonsafety-related SSCs that have a spatial relationship such that failure could adversely impact the performance of a safety-related SSC intended function, and including the identified nonsafety-related SSC within the scope of license renewal without consideration of plant mitigative features. With the exception of the Turbine Building and Offgas Building, LSCS applied the preventive option for 10 CFR 54.4(a)(2) scoping.

The preventive option assumes potential spatial interaction in structures or portions of structures that contain active or passive SSCs that have safety-related functions. The structures of concern for potential spatial interaction were identified based on a review of the CLB to determine which structures contained active or passive safety-related SSCs. Plant walkdowns were performed as required to confirm that all structures containing safety-related SSCs were identified. With the exception of the Turbine Building and Offgas Building, it was assumed that all nonsafety-related SSCs within these structures were located in proximity to safety-related SSCs where potential spatial interaction could occur.

The Turbine Building and Offgas Building have few areas containing safety-related SSCs. Mitigative features were used to prevent spatial interaction between these safety-related SSCs and nonsafety-related SSCs in other areas. No credit was taken for separation by distance alone without a mitigative feature capable of preventing the spatial interaction. The mitigative features were included in the scope of license renewal. This evaluation was documented in a technical basis document.

Nonsafety-related piping and components that contain water, oil, or steam, and are located inside structures that contain safety-related SSCs, are included in scope for potential spatial interaction under criterion 10 CFR 54.4(a)(2), unless located in an area where there is no concern with spatial interaction. High-energy lines with potential spatial interaction are included in the scope of license renewal under 10 CFR 54.4(a)(1) or (a)(2) depending on their safety classification. Safety-related high-energy lines are in scope under 10 CFR 54.4(a)(1), and nonsafety-related high-energy lines are in scope under 10 CFR 54.4(a)(2). Potential spatial interaction due to leakage or spray is assumed for system pressure as low as atmospheric.

Air and gas systems (non-liquid) are not a hazard to other plant equipment, and have therefore been determined not to have spatial interactions with safety-related SSCs. SSCs containing air or gas cannot adversely affect safety-related SSCs due to leakage or spray, since gas systems contain no liquids that could spray or leak onto safety-related systems to cause shorts or other malfunctions. LSCS operating experience was reviewed and confirmed that there have been no failures due to aging in systems containing air or gas that have adversely impacted the accomplishment of a safety function. Additionally, air and gas systems are classified as moderate energy systems. As described in NEI 95-10, Appendix F, paragraph 5.2.2.2.2, physical impact from pipe whip or jet impingement from moderate energy systems do not occur and need not be considered. Thus the nonsafety-related systems containing air or gas are not included in the scope of license renewal for spatial interaction. The supports are included in scope to prevent the nonsafety-related piping from falling down and potentially impacting safety-related SSCs.

The piping systems included in the scope of license renewal under 10 CFR 54.4(a)(2) for potential spatial interaction with safety-related SSCs are identified on the license renewal boundary drawings in red.

Scoping of Abandoned Equipment

Abandoned equipment is not included within the scope of license renewal if it has been confirmed to be isolated, vented, and drained. If this confirmation cannot be made, the system or portions thereof, are included within the scope of license renewal for aging management. Abandoned equipment is not relied on to perform any function delineated in 10 CFR 54.4(a)(1) or (a)(3) as it is nonoperational. However, failure of abandoned equipment could potentially impact the performance of the safety-related function of surrounding equipment if the abandoned equipment contains water, steam, or oil. The abandoned equipment excluded from scope has been vented, fluids drained, and isolated, and therefore, this equipment does not perform any intended function for license renewal. In addition, disconnection of wiring for power, control, or parameter indication and air supplies is not necessary to assure that the abandoned equipment has no potential spatial interaction with surrounding equipment.

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

In accordance with 10 CFR 54.4(a)(3), the systems, structures, and components within the scope of license renewal include:

> *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), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.61), and station blackout (10 CFR 50.63).*

The regulation for pressurized thermal shock (10 CFR 50.61) is applicable to pressurized water reactors only, and therefore not applicable to LSCS which is a boiling water reactor. For each of the other four regulations, a technical basis document was prepared to provide input into the scoping process. Each of the regulated event basis documents (described in Section 2.1.3.4) identify the systems and structures that are relied upon to demonstrate compliance with the applicable regulation. The basis documents also identify the source documentation used to determine the scope of components within the system that are credited to demonstrate compliance with each of the applicable regulated events. Guidance provided by the technical basis documents was incorporated into the system and structure scoping evaluations, to determine the SSCs credited for each of the regulated events. SSCs credited in the regulated events have been classified as satisfying criteria of 10 CFR 54.4(a)(3) and have been included within the scope of license renewal.

2.1.5.4 System and Structure Intended Functions

For the systems and structures within the scope of license renewal, the intended functions that are the bases for including them within the scope of license renewal are identified and documented in the scoping evaluation. The system or structure intended functions are based on the applicable CLB reference documents. For systems, the system level intended function descriptions associated with 10 CFR 54.4(a)(1) were standardized based on nuclear safety criteria for boiling water reactors as documented in industry standard ANSI/ANS-52.1-1983. The use of standardized 10 CFR 54.4(a)(1) functions provided for consistent function application and appropriate level of detail for system level intended function descriptions. The component level intended functions are the passive component functions that are necessary to support the system or structure intended function(s). The structure and component intended functions are further described in Section 2.1.6.2.

2.1.5.5 Scoping Boundary Determination

Systems and structures that are included within the scope of license renewal are then further evaluated to determine the population of in scope structures and components. This part of the scoping process is also a transition from the scoping process to the screening process. The process for evaluating mechanical systems is different from the process for structures, primarily because the plant design document formats are different. Mechanical systems are depicted primarily on the system piping and instrumentation diagrams (P&ID) that show the system components and their functional relationships, while structures are depicted on physical drawings. Electrical and I&C components of in scope electrical and in scope mechanical systems are placed into commodity groups and are screened as commodities. Scoping boundaries for mechanical systems, structures, and electrical systems are, therefore, described separately.

Mechanical Systems

For mechanical systems, the mechanical components that support the system intended functions are included within the scope of license renewal and are depicted on the applicable system piping and instrumentation diagram. Mechanical system piping and instrumentation diagrams are marked up to create license renewal boundary drawings showing the in scope components. Components that are required to perform or support a safety-related function, or a function that demonstrates compliance with one of the license renewal regulated events, are identified on the system piping and instrumentation diagrams by green highlighting. Nonsafety-related components that are connected to safety-related components and are required to provide structural support at the safety/nonsafety interface, or components whose failure could prevent satisfactory accomplishment of a safety-related function due to spatial interaction with safety-related SSCs, are identified by red highlighting. A computer sort and download of associated system components from the Passport equipment database confirms the scope of components in the system. Plant walkdowns were performed when required for additional confirmation.

Structures

For structures, the structural components that support the intended functions are included in the scope of license renewal. The structural components are identified from a review of applicable plant design drawings of the structure, applicable UFSAR sections, and design basis documentation. Plant walkdowns were performed when required for additional confirmation. Structural bolting required to support the structure proper is evaluated with the structure. Structural bolting supporting the intended function of a component support or a structural commodity component is evaluated with the component support or structural commodity component. A site plan layout drawing is marked up to create a license renewal boundary drawing showing the structures within the scope of license renewal.

Electrical Systems

Electrical and I&C systems, and electrical components within mechanical systems, did not require further system evaluations to determine which components were required to perform or support the identified intended functions. A bounding scoping approach is used for electrical equipment. All electrical components within in scope systems were included within the scope of license renewal. In scope electrical components were placed into commodity groups and were evaluated as commodities during the screening process as described in Section 2.1.6.

2.1.6 SCREENING PROCEDURE

Once the SSCs within the scope of license renewal have been determined, the next step is to determine which structures and components are subject to an aging management review.

2.1.6.1 Identification of Structures and Components Subject to AMR

The requirement to identify structures and components subject to an aging management review is specified in 10 CFR 54.21(a)(1), which states:

Each license renewal 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.

Structures and components 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 procedure is the process used to identify the passive, long-lived structures and components within the scope of license renewal that are subject to aging management review.

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 and, if applicable, on the associated license renewal boundary drawing.

The LSCS structures and components subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.21(a)(1) described above. The process implemented to meet these requirements for mechanical systems, structures, and electrical commodities is described as follows:

Mechanical Systems

The mechanical system screening process began with the results from the scoping process. For in scope mechanical systems, the completed scoping packages include written descriptions and marked up system piping and instrumentation diagrams that clearly identify the in scope system boundary for license renewal. The marked up system piping and instrumentation diagrams are called license renewal boundary drawings. These system boundary drawings were reviewed to identify the passive, long-lived components, and the identified components were then entered into the license renewal database. Component listings from the Passport equipment database were also reviewed to confirm that all system components were considered. In cases where the system piping and instrumentation diagram did not provide sufficient detail, such as for some large vendor supplied components (e.g., compressors, emergency diesel generators), the associated component drawings or vendor manuals were also reviewed. Plant walkdowns were performed when required for confirmation.

Some mechanical components, when combined, are considered a complex assembly. A complex assembly is a predominantly active assembly where the performance of its components is closely linked to that of the intended function of the entire assembly, such that testing and monitoring of the assembly is sufficient to identify degradation of these components. Examples of complex assemblies include diesel generators and chiller units. Complex assemblies are considered active and can be excluded from the requirements of AMR. However, to the extent that complex assemblies include piping or components that interface with external equipment, or components that cannot be adequately tested or monitored as part of the complex assembly, those components are identified and subject to aging management review. This follows the screening methodology for complex assemblies as described in Table 2.1-2 of NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants,” Revision 2 (reference 1.7.4).

Mechanical components are screened with the system in which they were scoped. For heat exchangers, the process side of the heat exchanger is evaluated with the process side system for aging management review. Likewise, the cooling water side of the heat exchanger is evaluated with the cooling water side system for aging management review.

Structures

The structure screening process also began with the results from the scoping process. For in scope structures, the completed scoping packages include written descriptions of the structure. If only selected portions of the structure are in scope, the in scope portions are described in the scoping evaluation. The associated structure drawings were reviewed to identify the passive, long-lived structures and components, and the identified structures and components were then entered into the license renewal database. Plant walkdowns were performed when required for confirmation.

Electrical Commodities

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

Electrical and I&C components such as elements, resistance temperature detectors (RTDs), sensors, thermocouples, and transducers as well as electric heaters primarily serve an electrical function; however, they can also serve a mechanical pressure boundary function. According to Appendix B of NEI 95-10, the electrical portions of these components are active per 10 CFR 54.21(a)(1)(i) and are therefore not subject to aging management review. Only the pressure boundary of such an in scope component is subject to aging management review, and the pressure boundary function for these electrical and I&C components is addressed in the mechanical review.

The sequence of steps and special considerations for identification of electrical commodities that require an aging management review is as follows:

1. Electrical and I&C components and commodities in systems within the scope of license renewal at LSCS were identified and listed. The listing provided by NEI 95-10, Appendix B, is the basis for this list. Electrical and I&C components and commodities were organized into groups such as circuit breakers, switches, and cables. Individual specific components were not identified. The electrical commodities were identified from a review of plant documents, controlled drawings, the Passport equipment database, and interface with the parallel mechanical screening efforts.

2. Following the identification of the electrical commodities, the criterion of 10 CFR 54.21(a)(1)(i) was applied to identify commodities that perform their functions without moving parts or without a change in configuration or properties (referred to as “passive” components). These commodities were identified utilizing the guidance of NEI 95-10.

3. Electrical and I&C components and commodities were not evaluated to determine if they perform a license renewal intended function during the scoping of systems. At this point in the screening process, the remaining passive electrical commodities are reviewed to determine if the commodity performs a license renewal intended function. If an electrical commodity does not perform a license renewal intended function, it is not considered further and, therefore, is not subject to an aging management review.

4. The screening criterion found in 10 CFR 54.21(a)(1)(ii) excludes those commodities 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 commodities that were not previously eliminated by the application of the 10 CFR 54.21(a)(1)(i) screening criterion. Components and commodities included in the plant environmental qualification (EQ) program are replaced on a specified interval based on a qualified life. Components and commodities in the EQ program do not meet the “long-lived” criterion of 10 CFR 54.21(a)(1)(ii) and are considered “short-lived” per the

regulatory definition and are, therefore, not subject to an aging management review.

5. Components and commodities which support or interface with electrical components and commodities, for example, cable trays, conduits, instrument racks, panels and enclosures, are evaluated as structural components in Section 2.4.

The electrical commodities that require an aging management review are the separate electrical commodities that are not part of a larger active component.

The passive commodities that are not subject to replacement based on a qualified life or specified time period are subject to an aging management review. For LSCS, the electrical commodities that require an aging management review are identified in Section 2.5.

2.1.6.2 Intended Function Definitions

The intended functions that the components and structures must fulfill are those functions that are the bases for including them within the scope of license renewal. A component intended function is defined as a passive component function that must be performed in order for the system or structure to be able to perform the system or structure intended function(s). For example, pressure boundary failure of a component would cause loss of inventory from the system, and the system would subsequently be unable to perform its intended function(s). Structures and components may have multiple intended functions. LSCS has considered multiple intended functions where applicable, consistent with the staff guidance provided in Table 2.1-3 of NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants” (reference 1.7.4).

Table 2.1-1 provides expanded definitions of structure and component passive intended functions identified in this application.

Table 2.1-1 Passive Structure and Component Intended Function Definitions

Intended Function	Definition
Absorb Neutrons	Absorb neutrons.
Containment, Holdup and Plateout	Provide post-accident containment, plateout of iodine and holdup (for radioactive decay) of iodine and non-condensable gases before release.
Direct Flow	Provide spray shield or curbs for directing flow. Also applies to diffuser credited for fluid diffusion/dissipation.
Electrical Continuity	Provide electrical connections to specified sections of an electrical circuit to deliver voltage, current, or signals.
Filter	Provide filtration or foreign material exclusion.
Fire Barrier	Provide rated fire barrier to confine or retard fire from spreading to or from adjacent areas of the plant.
Flood Barrier	Provide flood protection barrier (internal and external flood event).
Gaseous Release Path	Provide path for release of filtered and unfiltered gaseous discharge.
Heat Transfer	Provide heat transfer.
HELB/MELB Shielding	Provide shielding against high energy line breaks (HELB), and protective features for medium energy line breaks (MELB).
Insulate (Electrical)	Insulate and support an electric conductor.
Leakage Boundary	Nonsafety-related component that maintains mechanical and structural integrity to prevent spatial interactions that could cause failure of safety-related SSCs. This function includes the required structural integrity when the nonsafety-related leakage boundary piping is also attached to safety-related piping.
Maintain Adhesion	Provides adhesion to the substrate.
Mechanical Closure	Provide closure of components. Typically used with bolting.
Missile Barrier	Provide missile barrier (internal or external missiles).
Pipe Whip Restraint	Provide pipe whip restraint.

Table 2.1-1 Passive Structure and Component Intended Function Definitions

Intended Function	Definition
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, or provide the containment, holdup and plateout function (for Main Steam system).
Pressure Relief	Provide overpressure protection.
Shelter, Protection	Provide shelter/protection to safety-related components.
Shielding	Provide shielding against radiation.
Spray	Convert fluid into spray.
Structural Integrity	Nonsafety-related component that maintains mechanical and structural integrity to provide structural support to attached safety-related piping.
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 support for structures and components within the scope for 10 CFR 54.4(a)(1), (a)(2), or (a)(3) or provide structural integrity to preclude nonsafety-related component interactions that could prevent satisfactory accomplishment of a safety-related function.
Structural Support to maintain core configuration and flow distribution	Provide structural support of fuel assemblies, control rods, and incore instrumentation, to maintain core configuration and flow distribution.
Thermal Insulation	Control of heat loss to preclude overheating of nearby safety-related SSCs.
Thermal Insulation Jacket Integrity	Provide jacket integrity for jacketed thermal insulation.
Throttle	Provide flow restriction.
Water retaining boundary	Provide an essentially leak-tight boundary.

2.1.6.3 Stored Equipment

For several fire zones, credit is taken for making repairs to equipment in order to perform safe shutdown functions. In all cases, such credit is taken only to accomplish a function required for cold shutdown. Equipment that is stored on site for installation or use in achieving cold shutdown is considered to be within the scope of license renewal. Specific repairs credited for individual fire zones are discussed in the LSCS Fire Protection Report (FPR) subsection H.4.5. For each repair credited in the FPR, a procedure has been written and is available to cover the repair, and, the quantity and specific type of materials required by the analysis and the procedure are reserved onsite. Periodic surveillances are performed to inventory and check the availability of equipment necessary to support the repairs. Tools and supplies used to place the stored equipment in service are not within the scope of license renewal.

2.1.6.4 Consumables

The evaluation process for consumables is consistent with the guidance provided in NUREG-1800, Table 2.1-3. Consumables have been divided into the following four (4) groups 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, component seals, and O-rings): Based on ANSI B31.1 and the ASME B&PV Code Section III, these subcomponents of pressure retaining components 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: AMRs were required for structural sealants in structures within the scope of license renewal. A summary of the AMR results is presented in Section 3.5.
- Group (c) subcomponents (oil, grease, and component filters): These subcomponents are short-lived and are periodically replaced. Various plant procedures are used in the replacement of oil, grease, and filters in components that are in scope for license renewal. Therefore, these subcomponents are not subject to an AMR.
- 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 NFPA 10 for portable fire extinguishers, 29 CFR 1910.134 for self-contained breathing air packs, and NFPA 1962 for fire hoses (with exceptions to NFPA standards as identified in the LSCS FPR). These require replacement of equipment based on their condition or performance during

testing and inspection. The periodic inspections are implemented by controlled LSCS procedures. These components are subject to replacement based on requirements implemented by controlled procedures, and are therefore not long-lived and not subject to an aging management review.

2.1.7 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. This guidance suggests that GSIs involving issues related to license renewal aging management reviews or TLAAs should be addressed in the license renewal application. Based on Nuclear Energy Institute (NEI) and NRC guidance, NUREG-0933 “Resolution of Generic Safety Issues,” Supplement 34 (reference 1.7.14) and previous license renewal applicants, the following GSIs are addressed for LSCS license renewal:

- GSI 186, Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants – This GSI addresses heavy load issues related to crane design and operation. Aging effects are not central to these issues. The issue does not involve time-limited aging evaluations, including typical crane-related TLAAs such as cyclic loading analyses.

- GSI 190, Fatigue Evaluation of Metal Components for 60-year Plant Life – This GSI addresses fatigue life of metal components and was closed by the NRC. In the closure letter, however, the NRC concluded that licensees should address the effects of reactor coolant environment on component fatigue life as aging management programs are formulated in support of license renewal. Accordingly, the issue of environmental effects on component fatigue life is addressed in Section 4.3.

- GSI-193, BWR ECCS Suction Concerns – This GSI addresses the possible failure of low pressure emergency core cooling systems due to unanticipated, large quantities of entrained gas in the suction piping from the pressure suppression chamber (torus) in BWR Mark I containments. This issue is not applicable to LSCS which is Mark II containment.

NUREG-0933 was reviewed and there are no new generic issues that involve issues related to license renewal aging management reviews or TLAAs.

2.1.8 CONCLUSION

The scoping and screening methodology described above was used for the LSCS IPA to identify the systems, structures, and components that are within the scope of license renewal and that are subject to 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).

2.2 PLANT LEVEL SCOPING RESULTS

Table 2.2-1 lists the LaSalle County Station systems, structures and commodity groups that were evaluated to determine if they were within the scope of license renewal, using the methodology described in Section 2.1. A reference to the section of the application that contains the scoping and screening results is provided for each in scope system, structure and commodity group in the Table.

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope for License Renewal?	Reference
Reactor Vessel, Internals, and Reactor Coolant System		
Reactor Coolant Pressure Boundary System	Yes	2.3.1.1
Reactor Vessel	Yes	2.3.1.2
Reactor Vessel Internals	Yes	2.3.1.3
Engineered Safety Features		
High Pressure Core Spray System	Yes	2.3.2.1
Low Pressure Core Spray System	Yes	2.3.2.2
Reactor Core Isolation Cooling System	Yes	2.3.2.3
Residual Heat Removal System	Yes	2.3.2.4
Standby Gas Treatment System	Yes	2.3.2.5
Auxiliary Systems		
Auxiliary Steam System	No	UFSAR 9.2.8.2, 11.2.1.7
Closed Cycle Cooling Water System	Yes	2.3.3.1
Combustible Gas Control System	Yes	2.3.3.2
Compressed Air System	Yes	2.3.3.3
Control Rod Drive System	Yes	2.3.3.4
Control Room Ventilation System	Yes	2.3.3.5
Cranes, Hoists, and Refueling Equipment System	Yes	2.3.3.6
Demineralized Water Makeup System	Yes	2.3.3.7
Diesel Generator and Auxiliaries System	Yes	2.3.3.8
Drywell Pneumatic System	Yes	2.3.3.9
Electrical Penetration Pressurization System	Yes	2.3.3.10

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope for License Renewal?	Reference
Essential Cooling Water System	Yes	2.3.3.11
Fire Protection System	Yes	2.3.3.12
Fuel Pool Cooling and Storage System	Yes	2.3.3.13
Nonessential Cooling Water System	Yes	2.3.3.14
Nonsafety-Related Ventilation System	Yes	2.3.3.15
Plant Drainage System	Yes	2.3.3.16
Primary Containment Ventilation System	Yes	2.3.3.17
Process Radiation Monitoring System	Yes	2.3.3.18
Process Sampling and Post Accident Monitoring System	Yes	2.3.3.19
Radwaste System	Yes	2.3.3.20
Reactor Water Cleanup System	Yes	2.3.3.21
Safety-Related Ventilation System	Yes	2.3.3.22
Standby Liquid Control System	Yes	2.3.3.23
Suppression Pool Cleanup System	Yes	2.3.3.24
Traversing Incore Probe System	Yes	2.3.3.25
Steam and Power Conversion System		
Condensate System	Yes	2.3.4.1
Condenser and Air Removal System	Yes	2.3.4.2
Extraction Steam System	No	UFSAR 10.4.8
Feedwater System	Yes	2.3.4.3
Main Generator and Auxiliary System	No	UFSAR 10.1, 10.2
Main Steam System	Yes	2.3.4.4

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope for License Renewal?	Reference
Main Turbine and Auxiliaries System	Yes	2.3.4.5
Structures and Component Supports		
Auxiliary Building	Yes	2.4.1
Component Supports Commodity Group	Yes	2.4.2
Cooling Lake	Yes	2.4.3
Diesel Generator Building	Yes	2.4.4
Lake Screen House	Yes	2.4.5
Miscellaneous Not In Scope Structures	No	Comment 1
Offgas Building	Yes	2.4.6
Primary Containment	Yes	2.4.7
Radwaste Building	Yes	2.4.8
Reactor Building	Yes	2.4.9
Service Building	No	Comment 2
Structural Commodity Group	Yes	2.4.10
Switchyard Structures	Yes	2.4.11
Tank Foundation and Dikes	Yes	2.4.12
Turbine Building	Yes	2.4.13
Yard Structures	Yes	2.4.14
Electrical Components		
Area Radiation Monitoring System	Yes	UFSAR 7.7.9
Automatic Depressurization System	Yes	UFSAR 7.3.1.2.2
Auxiliary Power System	Yes	UFSAR 8.3.1

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope for License Renewal?	Reference
Cathodic Protection System	No	UFSAR Table 3.2-1
Communication System	Yes	UFSAR 9.5.2
DC Power System	Yes	UFSAR 8.3.2
Electrical Commodities	Yes	2.5.2.5
Heat Trace System	Yes	UFSAR 7.5.2.2, 7.4.2
Leak Detection System	Yes	UFSAR 7.6.2.2, 7.7.15
Miscellaneous Instrumentation System	No	UFSAR 2.3.3, 3.7.4, 7.7, 7.8
Neutron Monitoring System	Yes	UFSAR 7.6.3, 7.7.6
Offsite Power System	Yes	UFSAR 8.2
Plant Computer System	Yes	UFSAR 7.7.7
Plant Lighting System	Yes	UFSAR 9.5.3
Plant Security System	No	UFSAR 13.7
Primary Containment Isolation System	Yes	UFSAR 7.3.2
Reactivity Control System	Yes	UFSAR 7.6.5, 7.7.2
Reactor Protection System	Yes	UFSAR 7.2
Reactor Vessel Instrumentation, Controls and Display System	Yes	UFSAR 7.5, 7.7.1, 7.7.4
Remote Shutdown System	Yes	UFSAR 7.4.4

Comments:

1. The Miscellaneous Not In Scope Structures are nonsafety-related and provide support, shelter, and protection for personnel, stored materials, or nonsafety-related systems, structures, and components (SSC's) that do not perform an intended function for license renewal. These nonsafety-related structures are also separated from safety-related systems, structures, and components such that the structures' failure would not impact a safety-related function. Therefore, the following structures are not within the scope of

license renewal: Administration Building (also known as the South Service Building or New Service Building), Building #30 (Records Storage Vault or Records Storage Building), IDNS (Illinois Department of Nuclear Safety) Building, Project Management Field Office, Training Building, Maintenance Shop, Building #1 (contractor fab shop, radiological outage, equip storage), Road Maintenance Building, Weld Shop, Warehouse (Stores Warehouse), Warehouses 3 - 6, Contractor PreFab Shop, Shad Net Maintenance Building, In-Processing Facility, MAF (Main Access Facility), Security Checkpoint, Building #11 (TSC and Security Diesels), NAF (Old Permanent Gatehouse or Gatehouse), Sewage Treatment Plant, Water Softener Building (Building #41), MUDS (Makeup Demineralizer System) Trailers, Pump Houses: (Building #40), River Screen House, Lake Blowdown Outfall Structure, Transporter Building, Hazardous/Mixed Waste Storage Facility (Building #20), Radwaste Storage, Building #33, Filling Station, Station Heat Chiller Pad, and Fish Hatchery.

2. The Service Building is a nonsafety-related multi-story steel framed and reinforced concrete structure enclosed with metal siding above grade. The purpose of the Service Building is to provide structural support, shelter, and protection for machine and electric shops, storage, and administrative and maintenance personnel office areas. The Service Building reinforced concrete substructure is supported by a reinforced concrete mat foundation on soil. The service building roof is galvanized metal decking and built-up roofing. The Service Building is located adjacent to and northwest of the nonsafety-related Turbine Building. The Service Building is classified nonsafety-related and is separated from safety-related structures such that its failure would not impact a safety-related function. The external PMP flood elevation is below plant grade adjacent to the Service Building, and the Service Building is not relied upon to resist exterior flooding below grade. Evaluation of the Service Building determined that it does not perform an intended function delineated in 10 CFR 54.4 (a) and is not in scope for license renewal.

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 Pressure Boundary System (2.3.1.1)
- Reactor Vessel (2.3.1.2)
- Reactor Vessel Internals (2.3.1.3)

2.3.1.1 Reactor Coolant Pressure Boundary System

Description

The Reactor Coolant Pressure Boundary System (RCPB) is a normally operating system designed to provide the source of forced circulation of reactor coolant through the reactor core to remove the heat generated by fission. The RCPB also provides a flowpath to the reactor vessel for feedwater, high pressure core spray (HPCS), low pressure core spray (LPCS), standby liquid control (SLC), shutdown cooling, low pressure coolant injection, and reactor core isolation cooling (RCIC). The RCPB also includes piping within the flowpath for steam from the reactor to the main turbine, RCIC turbine, supply and return reactor coolant for the shutdown cooling and reactor water cleanup system (RWCU) functions, and provides pressure relief for the reactor vessel and reactor coolant pressure boundary piping and components. The RCPB includes all pressure containing components which are part of the plant reactor recirculation system or are connected to the reactor recirculation system, up to and including the outermost containment isolation valve in system piping which penetrates primary reactor containment, and the reactor coolant system safety relief valves.

The RCPB includes the ASME Section XI Class 1 portions of the following plant systems: reactor recirculation, HPCS, LPCS, SLC, residual heat removal (shutdown cooling and low pressure coolant injection), RCIC, RWCU, feedwater, main steam, and nuclear boiler instrumentation.

The RCPB also includes the ASME Section XI Class 2 portions of the nuclear boiler instrumentation system from the ASME Class 1 interface to pressure-retaining instruments, the control rod drive (CRD) system seal purge supply to the reactor recirculation pumps and makeup to the reactor level indication condensing chambers, and the reactor recirculation system sample piping.

The RCPB also includes subsystems that support the reactor recirculation system including the electro-hydraulic control (EHC) system associated with the reactor recirculation pump discharge flow control valves, the piping and instrumentation that supports the pump motor winding and bearing coolers, and oil reservoirs.

For more detailed information see UFSAR Chapter 5.0 and Appendix G.

Boundary

The RCPB license renewal scoping boundary begins at the piping attached to the reactor pressure vessel (RPV) nozzle safe end to piping welds. The RPV nozzles, safe-ends, and welds are included with the license renewal Reactor Vessel system. The RCPB boundary includes the piping connected to the 10 recirculation inlet nozzles, two recirculation outlet nozzles, four main steam nozzles, six feedwater nozzles, three low pressure coolant injection nozzles, 10 instrumentation nozzles, two jet pump instrument nozzles, one high pressure core spray nozzle, one low pressure core spray nozzle, one standby liquid control nozzle, one bottom head drain nozzle, one reactor head vent nozzle, one reactor head spray (RCIC) nozzle, and the reactor vessel head seal leak detection nozzle. The RCPB includes the main reactor recirculation flowpath, which begins at the pump suction piping attached to the reactor vessel nozzles, continues through the suction piping, suction valves, recirculation pump casings, discharge valves and discharge piping back to the RPV nozzles. Also included is the process sample line from the "B" recirculation pump discharge header to the sample cooler inlet valve, and the purge supply to the reactor recirculation pump seals from the CRD System from the outboard containment isolation check valves to the pump seals. Also included is the hydraulic control oil system and piping components from the hydraulic control power units in the Reactor Building to the hydraulic actuators on the recirculation pump discharge flow control valves. Also included are piping and instrumentation associated with lubrication and cooling of the recirculation pumps and motors. The scoping boundary to the Closed Cooling Water System is at the flanges that connect the plant reactor building closed cooling water system supply and return piping to the pumps and motors.

The RCPB boundary continues at the 20-inch branch connection off the reactor recirculation pump "A" suction line to the outermost Residual Heat Removal System (RHR) shutdown cooling suction containment isolation valve. The boundary includes the 12-inch RHR shutdown cooling return piping from the outermost containment valves to the branch connections off the 24-inch recirculation pump "A" and "B" discharge piping. The RCPB also includes the 4-inch RWCU System branch connections off the 24-inch recirculation pump "A" and "B" suction piping and the 2-inch reactor vessel bottom head drain from the RPV nozzle, which combine to a single 6-inch pipe to the RWCU System, and extends to the outboard containment isolation valve.

The RCPB includes the RHR piping that provides low pressure coolant injection and the LPCS and HPCS injection piping from the outboard containment isolation valves to the RPV nozzles. Also included is piping from the RPV and jet pump instrument nozzles through excess flow check valves outside of containment and to pressure-retaining instrumentation, and from the SLC RPV nozzle to the explosive injection valves that are outside primary containment.

The RCPB includes the main steam piping from the RPV nozzles, including the main steam line drains, to the outboard containment isolation valves. Also included is the inlet piping to the main steam relief valves and the main steam relief valve bodies. The main steam relief discharge piping is included with the license renewal Main Steam System. The RCPB includes the 10-inch branch connection off the "B" main steam line to the 4-inch RCIC System turbine steam supply piping up to the outboard containment isolation valve and the 10-inch blank flange connection to the RHR System. The RCPB also includes Feedwater System piping and components from the RPV nozzles to the outboard containment isolation check valves.

The RCPB includes the RCIC System pump discharge piping from the 6-inch flanged nozzle on the RPV head to outboard containment isolation valves and extends to the branch connection to RHR System piping to the outboard containment isolation valve. The RCPB includes the vent piping from the flanged 4-inch nozzle on the RPV head to the 2-inch branch connection off of the "A" main steam line, ending at the second isolation valve to the gland seal leak-off reservoir, and a 1-inch connection to the high point on the RCIC pump discharge piping to the RPV head. The RCPB also includes the ¾-inch seal leak detection line from the RPV head flange ending at the normally closed valve to the gland seal leak-off reservoir.

All associated piping, components and instrumentation within the flowpaths described above are included in the license renewal RCPB System. Included is instrumentation piping and components attached to the RCPB piping sections from the branch connections off the piping to pressure-retaining instrumentation. Instrumentation downstream of the excess flow check valves is included as shown on License Renewal Boundary Drawings.

Also included in the RCPB System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located in the Reactor Building and Primary Containment. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the scope of license renewal are RCPB System components located inside the EHC system reservoirs associated with the reactor recirculation pump discharge flow control valves, as these components do not have the potential for spatial interaction with safety-related equipment.

Reason for Scope Determination

The Reactor Coolant Pressure Boundary System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Reactor Coolant Pressure Boundary System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Reactor Coolant Pressure Boundary System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide reactor coolant pressure boundary. The Reactor Coolant Pressure Boundary System forms a barrier to minimize the release of reactor coolant and radioactive material to the Reactor Buildings. The Reactor Coolant Pressure Boundary System, in conjunction with the Reactor Protection System, provides overpressure protection for the reactor coolant pressure boundary. 10 CFR 54.4(a)(1)

2. Provide primary containment boundary. The Reactor Coolant Pressure Boundary System includes containment isolation valves. 10 CFR 54.4(a)(1)

3. Sense process conditions and generate signals for reactor trip or engineered safety features actuations. The Reactor Coolant Pressure Boundary System includes instrumentation and process controls that provide input signals to the Primary Containment Isolation System, Reactor Protection System, and ECCS systems. 10 CFR 54.4(a)(1)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Reactor Coolant Pressure Boundary System includes nonsafety-related fluid filled lines within the Reactor Building and Primary Containment which have the potential for spatial interaction with safety-related SSCs. 10 CFR 54.4(a)(2)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Reactor Coolant Pressure Boundary System provides the flow path for reactor coolant make-

up and decay heat removal, and maintains the reactor coolant pressure boundary in support of reactor safe shutdown. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Reactor Coolant Pressure Boundary System includes safety-related components located within areas of the plant that may have harsh environments, and therefore have environmental qualifications. 10 CFR 54.4(a)(3)

7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62). Reactor Coolant Pressure Boundary System components receive the recirculation pump trip signal from the Reactor Protection System and provides the flow path and maintains the pressure boundary for standby liquid control injection. 10 CFR 54.4(a)(3)

8. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The Reactor Coolant Pressure Boundary System provides the flow path for reactor coolant make-up and decay heat removal, and maintains the reactor coolant pressure boundary in support of reactor safe shutdown. 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.3.3
Table 3.2-1
5.0
7.7.3
Appendix G

License Renewal Boundary Drawings

LR-LAS-M-93, Sheets 1, 2, 3, 4, 5, 6, 7, 8
LR-LAS-M-2095, Sheet 1
LR-LAS-M-2097, Sheet 1
LR-LAS-M-2100, Sheet 2
LR-LAS-M-55, Sheets 1, 2, 7
LR-LAS-M-57, Sheet 1
LR-LAS-M-90, Sheet 2
LR-LAS-M-91, Sheet 4
LR-LAS-M-94, Sheet 1
LR-LAS-M-95, Sheet 1
LR-LAS-M-96, Sheets 1, 2, 3
LR-LAS-M-97, Sheet 1
LR-LAS-M-99, Sheet 1
LR-LAS-M-100, Sheet 5
LR-LAS-M-101, Sheets 1, 2
LR-LAS-M-115, Sheets 1, 12
LR-LAS-M-139, Sheets 1, 2, 3, 4, 5, 8, 9
LR-LAS-M-2146, Sheet 2
LR-LAS-M-2141, Sheet 1
LR-LAS-M-2143, Sheet 1

LR-LAS-M-116, Sheets 1, 2, 7
LR-LAS-M-118, Sheet 1
LR-LAS-M-136, Sheet 2
LR-LAS-M-137, Sheet 4
LR-LAS-M-140, Sheet 1
LR-LAS-M-141, Sheet 1
LR-LAS-M-142, Sheets 1, 2, 3
LR-LAS-M-143, Sheet 1
LR-LAS-M-145, Sheet 1
LR-LAS-M-146, Sheet 6
LR-LAS-M-147, Sheets 1, 2
LR-LAS-M-159, Sheet 1

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

Component Type	Intended Function
Accumulator	Leakage Boundary
Bolting	Mechanical Closure
Class 1 Piping, Fittings and Branch Connections < NPS 4"	Pressure Boundary
Flow Device (Instrumentation Orifices)	Pressure Boundary
	Throttle
Flow Device (Main Steam Line Flow Restrictors)	Throttle
Heat Exchanger - (EHC Fluid) Tube Side Components	Leakage Boundary
Heat Exchanger - (Motor Oil Coolers) Shell Side Components	Leakage Boundary
Heat Exchanger - (Motor Winding Coolers) Tube Side Components	Leakage Boundary
Heat Exchanger - (Motor Winding Coolers) Tubes	Leakage Boundary
Hoses	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (EHC Skid)	Leakage Boundary
Pump Casing (RRP)	Pressure Boundary
RPV Flange Leak Detection Line	Pressure Boundary
Tanks (EHC Reservoir)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.1.2-1 Reactor Coolant Pressure Boundary System
Summary of Aging Management Evaluation

2.3.1.2 Reactor Vessel

Description

The Reactor Vessel system is a normally operating system designed to contain pressure and heat in the core and transfer this heat to the reactor coolant. The Reactor Vessel consists of the cylindrical vessel shell, lower vessel head, vessel support skirt, closure head, nozzles and safe ends, and closure studs and nuts.

The Reactor Vessel is in scope for license renewal and consists of the following plant system: nuclear boiler. The Reactor Vessel has interfaces with several other license renewal systems and components that are not within the license renewal boundary of the Reactor Vessel but are evaluated separately. These include the Control Rod Drive System, Neutron Monitoring System, Primary Containment, Reactor Coolant Pressure Boundary System, Reactor Vessel Internals, and Component Supports Commodity Group.

The purpose of the Reactor Vessel is to maintain the reactor vessel pressure boundary, provide structural support for the reactor vessel internals and core and, along with the Reactor Vessel Internals, provide a floodable volume. The Reactor Vessel provides a boundary to separate fission products from the environment. The system is required for plant start-up, normal plant operations and normal shutdown.

For more detailed information see UFSAR Section 5.3.

Boundary

The components within the Reactor Vessel license renewal scoping boundary are those that comprise the reactor vessel, including nozzles (with integral safe ends and thermal sleeves), closure studs and nuts, and the vessel support skirt. The vessel top head includes one head vent nozzle, one head spray / reactor core isolation cooling nozzle, one spare nozzle and four lifting lugs. The cylindrical portion of the vessel includes one flange seal leak detection line nozzle, four steam outlet nozzles, six feedwater inlet nozzles, one high pressure core spray nozzle, one low pressure core spray nozzle, one control rod drive hydraulic system return nozzle, 10 water level instrumentation nozzles, three residual heat removal / low pressure coolant injection nozzles, 10 recirculation inlet nozzles, two recirculation outlet nozzles, and two jet pump instrument nozzles. The bottom head includes one core differential pressure / standby liquid control nozzle, one drain nozzle, 185 control rod drive penetrations, and 55 in-core flux monitor penetrations.

The piping and components attached to these nozzles are included within other license renewal systems, as described below. The boundary between the Reactor Vessel and the Reactor Coolant Pressure Boundary System is at the weld between each reactor vessel nozzle safe-end and the attached piping and components. The boundary between the Reactor Vessel and the Control Rod Drive (CRD) System is at the flange attached to the CRD housing. The boundary between the Reactor Vessel and the Neutron Monitoring System is at the flange attached to the in-core monitor housing. The boundary between the Reactor Vessel and the Reactor Vessel Internals is at the CRD housing-to-guide tube weld and at the in-core monitor housing-to-guide tube weld.

There are multiple attachments to the reactor vessel for supporting various internal components. These internal attachments include guide rod brackets, steam dryer support brackets, dryer hold-down brackets, feedwater sparger brackets, jet pump riser support pads, core spray brackets, and surveillance specimen holder brackets. The boundary between the Reactor Vessel and the Reactor Vessel Internals is between the brackets and the attached components. The brackets are included within the Reactor Vessel scoping boundary and the attached components are included within the Reactor Vessel Internals scoping boundary.

There are also external attachments to the reactor vessel within the scope of the Reactor Vessel. The Unit 1 reactor vessel skirt is connected to a ring girder adapter via 60 bolts, all within the Reactor Vessel scoping boundary. The ring girder adapter is connected to the reactor vessel support pedestal via 120 anchor bolts, which are within the Component Supports Commodity Group. The Unit 2 reactor vessel skirt is connected directly to the reactor vessel support pedestal via 120 anchor bolts which are also within the Component Supports Commodity Group. The reactor vessel support skirt, ring girder adaptor and bolts, stabilizer bracket lugs and refueling bellows support bracket are within the Reactor Vessel scoping boundary. The refueling bellows and stabilizer bracket assembly are within the Primary Containment. The reactor vessel top head lifting lugs are within the scope of the Reactor Vessel.

Reason for Scope Determination

The Reactor Vessel meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Reactor Vessel is not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Reactor Vessel also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63). The Reactor Vessel is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49).

Intended Functions

1. Provide reactor coolant pressure boundary. The Reactor Vessel forms a barrier against the release of reactor coolant and radioactive material to the Reactor Building. 10 CFR 54.4(a)(1)

2. Maintain reactor core assembly geometry. The Reactor Vessel provides support to the Reactor Vessel Internals. The Reactor Vessel, along with the Reactor Vessel Internals, maintains a floodable volume within the reactor. 10 CFR 54.4(a)(1)

3. Provides structural support or restraint to SSCs in the scope of license renewal. The reactor pressure vessel support skirt and stabilizer brackets provide structural support for the reactor vessel. The refueling bellows bracket provides support for the refueling bellows. 10 CFR 54.4(a)(1)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Reactor Vessel provides the flow path and maintains the pressure boundary for reactor safe shutdown. 10 CFR 54.4(a)(3)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62). The Reactor Vessel provides the flow path and maintains the pressure boundary for standby liquid control injection. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The Reactor Vessel provides the flow path and maintains the pressure boundary for reactor safe shutdown. 10 CFR 54.4(a)(3)

UFSAR References

3.9.5
5.1
5.3

License Renewal Boundary Drawings

None.

Table 2.3.1-2 <u>Reactor Vessel</u>
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting (Closure Studs - RPV)	Mechanical Closure
Bolting (Head Spray, CRD Housing, Head Vent, Spare Nozzle)	Mechanical Closure
N-1 Nozzle (Recirculation Outlet)	Pressure Boundary
N-1 Nozzle Safe Ends and Welds	Pressure Boundary
N-2 Nozzle (Recirculation Inlet)	Pressure Boundary
N-2 Nozzle Safe Ends and Welds	Pressure Boundary
N-2 Nozzle Thermal Sleeve	Direct Flow
N-3 Nozzle (Steam Outlet)	Pressure Boundary
N-3 Nozzle Safe Ends and Welds	Pressure Boundary
N-4 Nozzle (Feedwater)	Pressure Boundary
N-4 Nozzle Safe Ends and Welds	Pressure Boundary
N-4 Nozzle Thermal Sleeve	Direct Flow
N-5 Nozzle (Low Pressure Core Spray)	Pressure Boundary
N-5 Nozzle Safe End Extension	Pressure Boundary
N-5 Nozzle Safe Ends and Welds	Pressure Boundary
N-5 Nozzle Thermal Sleeve	Direct Flow
N-5 Thermal Sleeve Extension	Direct Flow
N-6 Nozzle (RHR / LPCI)	Pressure Boundary
N-6 Nozzle Safe End Extensions	Pressure Boundary
N-6 Nozzle Safe Ends and Welds	Pressure Boundary
N-6 Nozzle Thermal Sleeve Extension (Unit 2 Only)	Pressure Boundary
N-6 Thermal Sleeve	Direct Flow
N-7 Nozzle (Top Head Spray / RCIC - Flanged)	Pressure Boundary
N-7 Nozzle Flange	Pressure Boundary
N-7 Nozzle Welds	Pressure Boundary
N-8 Nozzle (Top Head Vent - Flanged)	Pressure Boundary
N-8 Nozzle Flange	Pressure Boundary
N-8 Nozzle Welds	Pressure Boundary
N-9 Nozzle (Jet Pump Instrumentation)	Pressure Boundary
N-9 Nozzle Safe End and Welds	Pressure Boundary
N10 Nozzle (CRD Hydraulic System Return Line - Capped)	Pressure Boundary
N10 Nozzle Cap and Welds	Pressure Boundary
N11 Nozzle (Core Differential Pressure and Liquid Control)	Pressure Boundary
N11 Nozzle Welds	Pressure Boundary
N12 Nozzle (Water Level Instrumentation - 366" Elevation)	Pressure Boundary
N12 Nozzle Extension and Welds	Pressure Boundary
N13 Nozzle (Water Level Instrumentation - 517" Elevation)	Pressure Boundary
N13 Nozzle Extension	Pressure Boundary

Component Type	Intended Function
N13 Nozzle Welds	Pressure Boundary
N14 Nozzle (Water Level Instrumentation - 599" Elevation)	Pressure Boundary
N14 Nozzle Extension	Pressure Boundary
N14 Nozzle Extension Welds	Pressure Boundary
N15 Nozzle (Bottom Head Drain)	Pressure Boundary
N16 Nozzle (High Pressure Core Spray)	Pressure Boundary
N16 Nozzle Safe End Extensions	Pressure Boundary
N16 Nozzle Safe Ends and Welds	Pressure Boundary
N16 Thermal Sleeve	Direct Flow
N16 Thermal Sleeve Extension (Unit 2 Only)	Direct Flow
N17 Nozzle (Seal Leak Detection)	Pressure Boundary
N18 (Top Head Spare - Flanged)	Pressure Boundary
N18 Nozzle Flange	Pressure Boundary
N19 CRD Nozzle (Housing and Flange)	Pressure Boundary
N19 CRD Nozzle (Welds)	Pressure Boundary
N19 CRD Nozzles (Stub Tubes)	Pressure Boundary
N20 Incore Monitor Nozzles (Housing and Flange)	Pressure Boundary
Reactor Vessel (Bottom Head and Welds)	Pressure Boundary
Reactor Vessel (Shell, Lower Flange, and Welds)	Pressure Boundary
Reactor Vessel (Top Head, Upper Flange, and Welds)	Pressure Boundary
Reactor Vessel External Attachments (Refueling Bellows Support)	Pressure Boundary
	Structural Support
Reactor Vessel External Attachments (Support Skirt and Stabilizer Bracket)	Structural Support
Reactor Vessel Internal Attachments	Structural Support to maintain core configuration and flow distribution

The aging management review results for these components are provided in:

Table 3.1.2-2 Reactor Vessel
Summary of Aging Management Evaluation

2.3.1.3 Reactor Vessel Internals

Description

The Reactor Vessel Internals is a normally operating system within the Reactor Vessel that is designed to control the generation of heat in the reactor core, to transfer this heat to the reactor coolant, and to supply dry steam to the Main Steam System. The Reactor Vessel Internals include fuel assemblies that generate the heat in the core, control rods and control rod drive (CRD) assemblies that control reactivity in the core, and neutron flux detector assemblies that monitor core reactivity. The Reactor Vessel Internals also includes the core shroud, shroud support and access hole covers, shroud head and steam separator, core plate and holddown bolts, top guide, fuel supports, core spray piping and spargers, low pressure coolant injection (LPCI) couplings, jet pump assemblies, feedwater spargers, control rod guide tubes, incore instrumentation guide tubes and dry tubes, core plate differential pressure and standby liquid control injection line, jet pump differential pressure sensing lines, surveillance sample holders, and the steam dryer assembly.

The purpose of the Reactor Vessel Internals is to maintain reactor core assembly geometry, to achieve and maintain the reactor core subcritical for any mode of normal operation or event, to control reactivity in the nuclear reactor core, and to maintain core thermal and hydraulic limits. The purpose of the fuel assemblies is to allow efficient heat transfer from the nuclear fuel to the reactor coolant, to maintain structural integrity, and to provide a fission product barrier. The purpose of the control rods and CRD assemblies is to absorb neutrons in the reactor core to control reactivity. The core shroud, shroud support, core plate, top guide, fuel supports, and control rod guide tubes provide structural support for the reactor core, control rod assemblies, and the incore instrumentation. The configuration of the core shroud, core plate, and jet pump assemblies directs coolant flow through the core and maintains a floodable volume of coolant around the fuel. The core spray piping and spargers and LPCI couplings supply and distribute coolant within the shroud during accident conditions. The core plate differential pressure and standby liquid control injection line provides a flowpath for injecting a neutron absorber into the reactor core when the normal method of controlling core reactivity with control rods is unavailable. The steam dryer assembly removes moisture from the wet steam leaving the steam separators. The Reactor Vessel Internals system is required for plant start-up, normal plant operations, normal shutdown, transient, and accident conditions.

For more detailed information see UFSAR Sections 3.9.5 and 4.1.2.

Boundary

The Reactor Vessel Internals license renewal scoping boundary includes components that are inside the Reactor Vessel. The following Reactor Vessel Internals components perform a safety-related function and are therefore within the scope of license renewal: the core shroud, shroud support and access hole covers, core spray piping and spargers, LPCI couplings, core plate and core plate bolts, fuel supports, top guide, jet pump assemblies, core plate differential pressure and standby liquid control injection line, control rod guide tubes, and incore instrumentation guide tubes and dry tubes. Also within the scope of license renewal is all repair hardware installed on reactor internal components. The steam dryer does not perform a safety-related function; however, it is included in the license renewal scope because failure of steam dryer components could result in loose parts that could potentially prevent satisfactory accomplishment of safety-related functions.

The fuel assemblies, control rods, and neutron flux detection assemblies are in scope for license renewal; however they are short-lived components and are therefore not subject to aging management review. The CRD assemblies are also in scope; however they are active assemblies and are therefore not subject to aging management review. The following Reactor Vessel Internals components are not safety-related and are not required to support intended functions; therefore they are not included within the scope of license renewal: The feedwater spargers, the shroud head and steam separator assembly including the guide rods and guide pins, incore guide tube stabilizers, jet pump differential pressure sensing lines, and the surveillance sample holders. A safety assessment for these components is documented in BWRVIP-06 Revision 1-A. The evaluation concluded that these components do not perform a safety-related function. This report also concluded that failure of these components does not result in consequential failure of safety-related components.

The reactor vessel nozzles and penetrations, including associated housings and stub tubes for the CRD assemblies, incore instrumentation, and core plate differential pressure and standby liquid control injection line penetrations are evaluated with the license renewal Reactor Vessel system.

Reason for Scope Determination

The Reactor Vessel Internals meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Reactor Vessel Internals meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Reactor Vessel Internals also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63). The Reactor Vessel Internals is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49).

Intended Functions

1. Maintain reactor core assembly geometry. The reactor internal components, in conjunction with the reactor pressure vessel, are designed to provide physical support to maintain fuel configuration and clearances to ensure core reactivity control and core cooling capability during normal and accident conditions. 10 CFR 54.4(a)(1)

2. Introduce negative reactivity to achieve and maintain subcritical reactor condition. The control rods and CRD assemblies adjust the concentration of the neutron absorber in the core during normal operations and shutdown conditions. 10 CFR 54.4(a)(1)

3. Introduce emergency negative reactivity to make the reactor subcritical. When a Reactor Protection System scram signal is received, high pressure water is applied to the CRD assemblies to rapidly insert each control rod into the core. The core plate differential pressure and standby liquid control line provides a flowpath for injecting a neutron absorber into the reactor core when control rods are unavailable. 10 CFR 54.4(a)(1)

4. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. Neutron flux detectors within the reactor core initiate a Reactor Protection

System scram signal to shutdown the reactor upon a high flux condition. 10 CFR 54.4(a)(1)

5. Provide emergency core cooling where the equipment provides coolant directly to the core. The low pressure coolant injection couplings and core spray piping and spargers distribute emergency core cooling flow within the shroud to the reactor core. 10 CFR 54.4(a)(1)

6. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The nonsafety-related steam dryer could interact with safety-related components. 10 CFR 54.4(a)(2)

7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transients Without Scram (10 CFR 50.62). The Standby Liquid Control System injects through the core plate differential pressure and standby liquid control line. 10 CFR 54.4(a)(3)

8. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The Reactor Vessel Internals system includes CRD assemblies and control rod blades that are required to achieve and maintain safe shutdown of the reactor. 10 CFR 54.4(a)(3)

9. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Reactor Vessel Internals system includes CRD assemblies and control rod blades that are required to achieve and maintain safe shutdown of the reactor. 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.3.2
Table 3.2-1
3.9.5
4.1.2
5.2.2

License Renewal Boundary Drawings

None.

Table 2.3.1-3 <u>Reactor Vessel Internals</u>
Components Subject to Aging Management Review

Component Type	Intended Function
Core Shroud (Including Repairs) and Core Plate: Core Shroud (Upper, Central, Lower)	Structural Support to maintain core configuration and flow distribution
Core Shroud (Including Repairs) and Core Plate: Shroud Support Structure (Shroud Support Cylinder, Shroud Support Plate, Shroud Support Legs and Gussets)	Structural Support to maintain core configuration and flow distribution
Core Shroud and Core Plate: Access Hole Cover (Welded Covers)	Direct Flow
Core Shroud and Core Plate: Core Plate, Core Plate Bolts	Structural Support to maintain core configuration and flow distribution
Core Shroud and Core Plate: LPCI Coupling	Direct Flow
Core Spray Lines and Spargers: Core Spray Lines (Headers), Spray Rings, Spray Nozzles	Direct Flow
Fuel Supports and Control Rod Drive Assemblies: Orificed Fuel Support	Structural Support to maintain core configuration and flow distribution
	Throttle
Instrumentation: Intermediate Range Monitor (IRM) Dry Tubes, Source Range Monitor (SRM) Dry Tubes, Incore Neutron Flux Monitor Guide Tubes	Structural Support to maintain core configuration and flow distribution
Jet Pump Assemblies: Castings	Direct Flow
Jet Pump Assemblies: Inlet Riser and Brace, Holddown Beam, Diffuser, Tailpipe, Wedges, and Repair Components	Direct Flow
Reactor Vessel Internals Components: Control Rod Drive Guide Tube	Structural Support to maintain core configuration and flow distribution
Reactor Vessel Internals Components: Core Plate DP/SLC Line	Direct Flow
Steam Dryers	Structural Integrity
Top Guide	Structural Support to maintain core configuration and flow distribution

The aging management review results for these components are provided in:

Table 3.1.2-3 Reactor Vessel Internals
Summary of Aging Management Evaluation

2.3.2 ENGINEERED SAFETY FEATURES SYSTEMS

The following systems are addressed in this section:

- High Pressure Core Spray System (2.3.2.1)
- Low Pressure Core Spray System (2.3.2.2)
- Reactor Core Isolation Cooling System (2.3.2.3)
- Residual Heat Removal System (2.3.2.4)
- Standby Gas Treatment System (2.3.2.5)

2.3.2.1 High Pressure Core Spray System

Description

The High Pressure Core Spray (HPCS) System is a standby high pressure emergency core cooling system (ECCS) designed to prevent excessive fuel cladding temperatures following any break in the nuclear system piping. The HPCS System accomplishes this by delivering water into the reactor pressure vessel (RPV) over a wide range of pressures. The HPCS system provides and maintains an adequate coolant inventory inside the reactor vessel to maintain fuel cladding temperatures below fragmentation temperature in the event of breaks in the reactor coolant pressure boundary. For small breaks that do not result in rapid reactor depressurization, the HPCS system spray maintains reactor water level and depressurizes the vessel. For large breaks, the HPCS system sprays the top surface of the core to cool the core until sufficient water accumulates in the vessel to reflood the core.

The HPCS System consists of a single, motor-driven pump and associated piping, valves, controls and instrumentation. The principal HPCS System equipment is located outside the primary containment. Suction piping is provided from the suppression pool. The suppression pool water source assures a closed cooling water supply for extended operation of the HPCS System. After entering the vessel, HPCS flow divides and enters the shroud at two points near the top of the shroud. A semicircular sparger is attached to each outlet. Nozzles are spaced around the spargers to spray the water radially over the core and into the fuel assemblies. The HPCS System injection piping is provided with an isolation valve on each side of the containment barrier. Remote controls for operating the valves and diesel generator are provided in the plant control room.

HPCS System operation is initiated automatically by either a reactor low water level or primary containment (drywell) high pressure signal, or can be initiated manually. The HPCS System is independent of electrical connections to any other system except the normal a-c power supply. The HPCS System is designed to operate from normal offsite auxiliary power sources or from a diesel generator if offsite power is not available.

For more detailed information, see UFSAR Sections 7.3.1.2.1 and 6.3.2.2.1.

Boundary

The HPCS scoping boundary begins at the HPCS suction strainer in the suppression pool and continues through suction piping and a primary containment isolation valve, through the HPCS pump, and terminates at the upstream side of the HPCS discharge outboard primary containment isolation valve (evaluated with the Reactor Coolant Pressure Boundary System). The HPCS scoping boundary includes a minimum flow and a full flow test line which begins at the discharge of the HPCS pump and continues through primary containment isolation valves prior to terminating inside the suppression pool.

The water leg fill portion of the HPCS begins at the suction of the HPCS pump and continues through the water leg pump suction piping, through the water leg pump, and terminates at the discharge piping of the HPCS pump.

All associated piping, components and instrumentation contained within the boundary described above are also included in the HPCS scoping boundary.

Also included in the HPCS System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the HPCS System scoping boundary are the piping and components associated with the discharge portion of the system from the HPCS discharge outboard primary containment isolation valve to the reactor vessel. These components are evaluated with the Reactor Coolant Pressure Boundary license renewal system.

Not included in the HPCS System scoping boundary is the circular sparger located above and around the core periphery. This is evaluated with the Reactor Vessel Internals license renewal system.

Not included in the HPCS System scoping boundary are the HPCS Diesel Generators. The HPCS Diesel Generators are evaluated with the Diesel Generator and Auxiliaries license renewal system.

Not included in the scope of license renewal are the nonsafety-related portions of the HPCS supply and return pipes from the cycled condensate storage tank to the Reactor Building as these pipes do not have the potential for spatial interaction with safety-related equipment.

Reason for Scope Determination

The High Pressure Core Spray System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The High Pressure Core Spray System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The High Pressure Core Spray System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The High Pressure Core Spray System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provide primary containment boundary. The HPCS System includes safety-related primary containment isolation valves on the HPCS suction from the suppression pool, HPCS relief valve discharge piping, and the HPCS full flow test and minimum flow lines. 10 CFR 54.4(a)(1)

2. Provide emergency core cooling where the equipment provides coolant directly to the core. The HPCS System provides core cooling following a break in the reactor coolant pressure boundary by delivering water from the suppression pool through nozzles in a circular sparger

located above and around the core periphery. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The HPCS System contains nonsafety-related water filled lines in the Reactor Building which have potential spatial and structural interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The HPCS System is credited for Fire Safe Shutdown by supporting the basic safe-shutdown method system. 10 CFR 54.4(a)(3)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The HPCS System contains components that are environmentally qualified. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The HPCS System is credited for reactor cooling and make-up for Station Blackout coping. 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.5.1
Table 3.2-1
Table 6.1-1
Table 6.2-21
Table 6.2-28
6.3.2.2.1
7.3.1.2.1

License Renewal Boundary Drawings

LR-LAS-M-95, Sheet 1
LR-LAS-M-141, Sheet 1
LR-LAS-M-91, Sheet 5
LR-LAS-M-137, Sheet 5
LR-LAS-M-2095, Sheet 1
LR-LAS-M-2141, Sheet 1

Table 2.3.2-1 **High Pressure Core Spray System**
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Pressure Boundary
	Throttle
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (HPCS Pump)	Pressure Boundary
Pump Casing (Water Leg Pump)	Pressure Boundary
Strainer Element	Filter
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.2.2-1 High Pressure Core Spray System
Summary of Aging Management Evaluation

2.3.2.2 Low Pressure Core Spray System

Description

The Low Pressure Core Spray System (LPCS) is a standby system designed to provide core cooling following a break in the reactor coolant pressure boundary which would rapidly depressurize the reactor vessel. The LPCS is also designed to provide core cooling following a small break in which the automatic depressurization system (ADS) or high-pressure core spray system (HPCS) has operated to lower the reactor vessel pressure to the operating range of the LPCS.

The purpose of the LPCS is to provide core cooling following a break in the reactor coolant pressure boundary. The LPCS accomplishes this by delivering water from the suppression pool through nozzles in a circular sparger located above and around the core periphery. The LPCS also includes a water leg pump which functions to keep the ECCS discharge lines filled to avoid hydrodynamic effects on ECCS pump initiation. The LPCS water leg pump services the LPCS and the “A” loop of the residual heat removal system (RHR).

The LPCS is automatically actuated by reactor vessel low water level or drywell high pressure, or, can be manually actuated from the control room. The ADS is interlocked with the LPCS by means of pressure switches located in the pump discharge piping upstream of the pump discharge check valves. The pump discharge pressure is used as a permissive for automatic initiation of ADS. This ensures that the LPCS pump has received electrical power, started, and is capable of delivering water into the vessel prior to vessel depressurization.

The LPCS includes primary containment isolation valves on the LPCS suction, minimum flow, and full flow test lines. To assure continuity of core cooling, signals to isolate the primary containment do not operate any LPCS valves which could affect flow to the reactor pressure vessel. The LPCS also includes relief valves for overpressure protection of the LPCS pump suction and discharge piping. These relief valves discharge into the suppression pool and are also primary containment isolation valves.

The LPCS contains components that are environmentally qualified. The LPCS primary containment isolation valves are credited for Station Blackout coping. The LPCS water leg pump is credited for Fire Safe Shutdown by supporting the “A” loop of RHR which is a basic method system.

For more detailed information see UFSAR Section 6.3.2.2.3.

Boundary

The LPCS scoping boundary begins at the LPCS suction strainer in the suppression pool and continues through suction piping and a primary containment isolation valve, through the LPCS pump, and terminates at the upstream side of the LPCS discharge outboard primary containment isolation valve (evaluated with the Reactor Coolant Pressure Boundary System). The LPCS scoping boundary includes a minimum flow and a full flow test line which begin at the discharge of the LPCS pump and continue through primary containment isolation valves prior to terminating inside the suppression pool.

The water leg fill portion of the LPCS begins at the suction of the LPCS pump and continues through the water leg pump suction piping, through the water leg pump, and terminates at the discharge piping of the LPCS pump and discharge piping of the “A” RHR pump.

All associated piping, components and instrumentation contained within the boundary described above are also included in the LPCS scoping boundary.

Also included in the LPCS System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the LPCS System scoping boundary are the piping and components associated with the discharge portion of the system from the pump discharge valve to the reactor vessel. These components are evaluated with the Reactor Coolant Pressure Boundary license renewal system.

Not included in the LPCS scoping boundary is the circular sparger located above and around the core periphery. This is evaluated with the Reactor Vessel Internals license renewal system.

<u>Reason for Scope Determination</u>

The Low Pressure Core Spray System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Low Pressure Core Spray System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Low Pressure Core Spray System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Low Pressure Core Spray System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

<u>Intended Functions</u>

1. Provide primary containment boundary. The LPCS includes safety-related primary containment isolation valves on the LPCS suction from the suppression pool, LPCS relief valve discharge piping, and the LPCS full flow test and minimum flow lines. 10 CFR 54.4(a)(1)

2. Provide emergency core cooling where the equipment provides coolant directly to the core. The LPCS provides core cooling following a break in the reactor coolant pressure boundary by delivering water from the suppression pool through nozzles in a circular sparger located above and around the core periphery. 10 CFR 54.4(a)(1)

3. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. LPCS pump discharge pressure is used as a permissive for automatic initiation of ADS. 10 CFR 54.4(a)(1)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The LPCS contains nonsafety-related water filled lines in the Reactor Building which have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The LPCS water leg pump is credited for Fire Safe Shutdown by supporting the “A” loop of RHR which is a basic method system. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The LPCS contains components that are environmentally qualified. 10 CFR 54.4(a)(3)

7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The LPCS primary containment isolation valves are credited for Station Blackout coping. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

1.2.2.5.3
Table 3.2-1
Table 6.1-1
Table 6.2-21
Table 6.2-28
6.3.2.2.3
7.3.1.2.2
7.3.1.2.3
Chapter 15
Table 15.9-4

<u>License Renewal Boundary Drawings</u>

LR-LAS-M-94, Sheet 1
LR-LAS-M-140, Sheet 1
LR-LAS-M-91, Sheet 5
LR-LAS-M-96, Sheet 1
LR-LAS-M-137, Sheet 5
LR-LAS-M-142, Sheet 1

Table 2.3.2-2 Low Pressure Core Spray System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Pressure Boundary
	Throttle
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (LPCS Pump)	Pressure Boundary
Pump Casing (Water Leg Pump)	Pressure Boundary
Strainer Element	Filter
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.2.2-2 Low Pressure Core Spray System
Summary of Aging Management Evaluation

2.3.2.3 Reactor Core Isolation Cooling System

Description

The Reactor Core Isolation Cooling (RCIC) System is a standby system designed to ensure that sufficient reactor water inventory is maintained in the reactor pressure vessel (RPV) to allow for adequate core cooling. The RCIC System is in scope for license renewal. However, portions of the RCIC System are not required to perform system intended functions and are not in scope.

Although not a safety system, the purpose of the RCIC System is to provide makeup water to the RPV when the vessel is isolated. The RCIC System accomplishes this by pumping water from the cycled condensate storage tank or directly from the suppression pool or from the suppression pool via the RHR heat exchangers, depending on reactor conditions, and discharges it through the head spray nozzle of the RPV to maintain reactor water level. This capability prevents reactor fuel from overheating when (1) the reactor vessel is isolated and maintained in the hot standby condition, (2) the reactor vessel is isolated and accompanied by loss of the coolant flow from the reactor feedwater system, or (3) the reactor vessel is shutdown under condition of loss of the normal feedwater system and prior to operation of the shutdown cooling system.

The RCIC System utilizes a steam-driven turbine-pump unit which operates automatically to maintain adequate water level in the RPV. The RCIC System steam supply is from the RPV upstream of the main steam isolation valves. The RCIC System supports RPV depressurization to a shutdown condition with the reactor coolant pressure boundary isolated by maintaining sufficient RPV water inventory. The RCIC System continues to operate until the RPV is depressurized to the point at which low pressure coolant injection and low pressure core spray system operation can maintain core cooling.

The RCIC System operation is initiated automatically by reactor vessel low water level or can be initiated manually. The RCIC System can be operated on DC emergency power without the need for AC emergency power.

For more detailed information, see UFSAR Sections 5.4.6 and 7.4.1.

Boundary

The RCIC System license renewal scoping boundary for water injection begins at the RCIC pump suction piping from the cycled condensate storage tank at the flange directly upstream of the outer manual shutoff valve, and also from the suppression pool at the suction strainer. The scoping boundary continues through to the RCIC pump to the discharge flow path. The discharge flow path continues through the discharge of the RCIC pump, and terminates at the RCIC injection valve outside of primary containment. The discharge path also includes a minimum flow line to the suppression pool and a test return line to the cycled condensate storage tank.

The RCIC System license renewal scoping boundary for the steam supply begins at the outboard RCIC containment isolation valve and continues through the RCIC turbine, and the RCIC turbine exhaust to the suppression pool. Auxiliary systems include gland seal, drain pots, and turbine lubricating and control oil.

All associated piping, components and instrumentation, contained within flow paths and subsystems described above are included in the RCIC System scoping boundary.

Also included in the RCIC System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the RCIC System scoping boundary are the piping and components associated with the water injection portion of the system from the RCIC injection valve outside of containment to the reactor vessel. These components are evaluated with the Reactor Coolant Pressure Boundary license renewal system.

Not included in the RCIC System scoping boundary are the piping and components associated with the main steam supply portion of the system up to and including the outboard RCIC steam isolation valve. These components are evaluated with the Reactor Coolant Pressure Boundary license renewal system.

Not included in the scope of license renewal are the abandoned RCIC System lines located in the Off Gas Filter Building. These lines are verified to be isolated, drained, and vented and therefore do not present a spatial interaction hazard to safety-related equipment. Also not included in the scope of license renewal are the RCIC System water return lines to the cycled condensate storage tanks. These lines are nonsafety-related and are not located in areas where there are potential spatial interactions with components performing safety-related functions, and therefore are not relied upon to perform or support any system intended function.

Not included in the RCIC System scoping boundary are the piping and components associated with the main steam supply portion of the system up to and including the outboard steam isolation valve. These components are evaluated with the Reactor Coolant Pressure Boundary license renewal system.

<u>Reason for Scope Determination</u>

The Reactor Core Isolation Cooling System meets 10 CFR 54.4(a)(1) because it has safety-related components that are relied upon to remain functional during and following design basis events. The Reactor Core Isolation Cooling System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Reactor Core Isolation Cooling System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Reactor Core Isolation Cooling System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Remove residual heat from the reactor coolant system. The RCIC System is capable of maintaining sufficient coolant inventory in the reactor vessel in case of an isolation with a loss of main feedwater flow. 10 CFR 54.4(a)(1)

2. Provide primary containment boundary. The RCIC System includes safety-related primary containment isolation valves on the RCIC suction from the suppression pool, HPCS relief valve discharge piping, and the RCIC full flow test and minimum flow lines. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The RCIC System includes nonsafety-related water filled lines in the Reactor Buildings that have the potential for spatial interactions (spray or leakage) or structurally interact with safety-related SSCs. 10 CFR 54.4(a)(2)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection. (10 CFR 50.48) The RCIC System supports Safe Shutdown. 10 CFR 54.4(a)(3)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The RCIC System includes environmentally qualified electrical components. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The RCIC System can be operated without AC power during a station blackout event to provide coolant to the reactor vessel. 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.3
5.4.6
7.4.1

License Renewal Boundary Drawings

LR-LAS-M-74, Sheet 1
LR-LAS-M-91, Sheet 5
LR-LAS-M-94, Sheet 1
LR-LAS-M-96, Sheet 4
LR-LAS-M-101, Sheets 1, 2
LR-LAS-M-127, Sheet 1
LR-LAS-M-137, Sheet 5
LR-LAS-M-140, Sheet 1
LR-LAS-M-142, Sheet 4
LR-LAS-M-147, Sheets 1, 2

Table 2.3.2-3 Reactor Core Isolation Cooling System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Pressure Boundary
	Throttle
Heat Exchanger - (Lube Oil Cooler) Shell Side Components	Pressure Boundary
Heat Exchanger - (Lube Oil Cooler) Tube Sheet	Pressure Boundary
Heat Exchanger - (Lube Oil Cooler) Tubes	Heat Transfer
	Pressure Boundary
Hoses	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Condenser Condensate Pump)	Leakage Boundary
Pump Casing (Condenser Vacuum Pump)	Leakage Boundary
Pump Casing (RCIC Pump)	Pressure Boundary
Pump Casing (Turbine Main Oil Pump)	Pressure Boundary
Pump Casing (Water Leg Pump)	Pressure Boundary
Rupture Disks	Pressure Boundary
Strainer Element	Filter
	Pressure Boundary
Tanks (Turbine Lube Oil Reservoirs)	Pressure Boundary
Tanks (Vacuum Tank)	Leakage Boundary
Turbine Casings (RCIC Turbine)	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.2.2-3 Reactor Core Isolation Cooling System
Summary of Aging Management Evaluation

2.3.2.4 Residual Heat Removal System

Description

The Residual Heat Removal (RHR) System is a standby heat removal system that also provides a low pressure emergency core cooling system (ECCS) function to supply cooling water for removal of fission product heat from the reactor core and primary containment following a postulated design basis event or normal operation. The low pressure coolant injection (LPCI) function of the RHR System is designed to provide cooling to the reactor core when the reactor vessel pressure is low, as is the case for large LOCA break sizes. However, when LPCI operates in conjunction with the Automatic Depressurization System (ADS) and High Pressure Core Spray System (HPCS), the effective core cooling capability of LPCI is extended to small breaks. The RHR System has multiple purposes, listed below. It accomplishes these purposes through circulation of water through the various available system flow paths.

The low pressure coolant injection (LPCI) mode is credited as an emergency core cooling system. The function of LPCI is to cool the reactor core by flooding the reactor pressure vessel (RPV) following a loss of coolant accident (LOCA). LPCI is automatically actuated by low reactor water level or high drywell pressure. LPCI takes water from the suppression pool and injects water directly into the core shroud. Reactor pressure must be reduced below normal operating pressure before LPCI can begin to flood the RPV. LPCI provides protection to the core for a large break, including a design basis accident (DBA) when the RPV rapidly depressurizes. It also provides protection during a small break after ADS has reduced pressure to the operating range of RHR. Using the suppression pool as a source of water, LPCI provides a closed loop for recirculation of water escaping from the break. The pumps, piping, and control systems are physically and electrically separated so that any single event will not render all of the loops inoperable.

The suppression pool cooling mode is used to cool the suppression pool during normal and emergency situations. The purpose of this mode is to remove the heat that gets transferred to the suppression pool during a LOCA or during operations that add heat to the suppression pool. Heat is rejected from the suppression pool through a pair of heat exchangers cooled by the Essential Cooling Water System.

The shutdown cooling and RPV head spray mode maintains the reactor core in a cold shutdown condition and meets the requirements for long-term heat removal. This mode is used to remove decay heat, prevent thermal stratification, and cool the reactor for maintenance and refueling. It also provides a flowpath for core cooling during emergency situations when the normal injection flow path is unavailable. Shutdown cooling takes water from the RPV, cools it in a heat exchanger cooled by the Essential Cooling Water System and then returns the water to the RPV where it is forced through the reactor core. Head spray is used to condense steam and cool the RPV head during RPV flooding operations and to prevent thermal stratification during shutdown cooling. Head spray diverts some of the shutdown cooling flow and sprays that water into the RPV head area.

The alternate shutdown cooling mode is used for decay heat removal when the normal mode of heat removal is unavailable.

The full flow test mode allows testing of certain RHR System components for system operability during all modes of reactor operation without having to inject water directly into the

RPV. The difference between the suppression pool cooling and full flow test modes is that in the test mode the heat exchanger bypass valve remains open.

The suppression chamber/drywell spray mode is used to condense any steam that may not have completely condensed in the suppression pool and drywell following a LOCA. It also provides an additional method of containment cooling that can be used in an emergency. The suppression pool is sprayed from a spray header installed in the inner circumference of the upper air space of the chamber and fed from either RHR A or B loops. The drywell is sprayed from either of two ring spray headers inside the drywell. One drywell spray header is supplied by RHR Loop A and the other is supplied by RHR Loop B. RHR pumps do not have sufficient capacity to simultaneously spray the drywell and supply the LPCI mode.

The fuel pool cooling assist mode uses the RHR loop B heat exchanger to assist in cooling the fuel pool during times of heavy heat load. This could occur when the entire reactor core is off-loaded shortly following reactor shutdown. The fuel pool cooling assist mode requires that spool pieces be installed to connect the RHR and Fuel Pool Cooling and Storage (FPC) Systems. Discharge from the RHR System to the FPC System terminates in a diffuser located in the fuel pool.

The RHR keep fill system uses a small pump (water leg pump) to keep the RHR discharge piping full downstream of the RHR pump discharge check valve. The RHR System may be used to remove water from the reactor while in shutdown cooling. Instead of returning all the water to the reactor, some water may be diverted to Radwaste System, the main condenser, or suppression pool. The RHR System can be used to control suppression pool water level and to drain water from the suppression pool during maintenance. The RHR ‘B’ loop can take water from the Fuel Pool Cooling and Storage System to flood the RPV if required.

For more detailed information see UFSAR Sections 5.4.7, 6.3.1 and 6.3.2.

<u>Boundary</u>

The RHR System license renewal scoping boundary begins with the strainers in the suppression pool and continues through individual suction headers and suction isolation valves to each of the three residual heat removal pumps. It continues from the pumps through discharge piping and valves to the reactor containment where it interfaces with the LPCI portion of the Reactor Coolant Pressure Boundary (RCPB) System at the outboard containment isolation valve for each LPCI injection line. The boundary also includes the piping and valves in the suction flowpath from the reactor recirculation suction line, which begins at the outboard containment isolation valve (part of the RCPB System) and continues to the RHR System pump suction headers. Also included are the RHR heat exchangers (RHR flowpath is through the shell side), including piping and valves in the lines to the heat exchangers and from them to the shutdown cooling injection outboard isolation valves (part of the RCPB System), and to the drywell spray, head spray and suppression pool spray and return flowpaths described below. The Essential Cooling Water System provides cooling water to the RHR heat exchanger tube side components. The RHR pump discharge flowpath includes the piping and valves to the containment spray piping (drywell and suppression pool), terminating at the spray rings and nozzles inside containment. The system scoping boundary also includes piping and valves in the full-flow test lines and minimum flow recirculation lines from the pump discharge to the suppression pool. The water leg fill portion of the RHR System begins at the suction of the RHR pump and continues through the water leg pump suction piping, through the water leg pump, and terminates at the discharge piping of the RHR pump.

All associated piping, components and instrumentation contained within the boundary described above are also included in the RHR System scoping boundary.

Also included in the RHR System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the RHR System scoping boundary are the piping and components associated with discharge portions of the system. These components are evaluated with the Reactor Coolant Pressure Boundary license renewal system.

Reason for Scope Determination

The Residual Heat Removal System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Residual Heat Removal System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Residual Heat Removal System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Residual Heat Removal System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provide primary containment boundary. The RHR System provides safety-related primary containment isolation capability on containment spray discharge, suppression pool suction, and test return lines penetrating the primary containment. 10 CFR 54.4(a)(1)

2. Remove residual heat from the reactor coolant system. The RHR System removes decay and sensible heat from the reactor primary system. 10 CFR 54.4(a)(1)

3. Provide emergency core cooling where the equipment provides coolant directly to the core. The RHR System provides water from the suppression pool to be injected directly into the core region of the reactor vessel following a LOCA. 10 CFR 54.4(a)(1)

4. Provide emergency heat removal from primary containment and provide containment pressure control. The RHR System provides for maintaining the suppression pool temperature below required limits following a reactor blowdown. The RHR System also provides for spraying the drywell and suppression pool vapor spaces to maintain internal pressure below design limits. 10 CFR 54.4(a)(1)

5. Sense process conditions and generate signals for reactor trip or engineered safety

features actuation. The RHR System provides for associated actuation and system protection logic for engineered safety features operation. 10 CFR 54.4(a)(1)

6. Ensure adequate cooling in the spent fuel pool to maintain stored fuel within acceptable temperature limits. The RHR System provides additional cooling capacity for fuel pool cooling. 10 CFR 54.4(a)(1)

7. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The RHR System contains nonsafety-related fluid filled lines within the Reactor Buildings which have the potential for spatial interaction with safety-related SSCs. 10 CFR 54.4(a)(2)

8. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The RHR System is credited for reactor makeup and heat removal for Fire Safe Shutdown. 10 CFR 54.4(a)(3)

9. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The RHR System has components credited in the Environmental Qualification program. 10 CFR 54.4(a)(3)

10. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The primary containment isolation and decay heat removal functions of the RHR System are credited for Station Blackout coping. 10 CFR 54.4(a)(3)

UFSAR References

5.4.7
6.2.1.1
6.2.2
6.3.1
6.3.2
7.4.3

License Renewal Boundary Drawings

LR-LAS-M-96, Sheets 1, 2, 3, 4, 5
LR-LAS-M-142, Sheets 1, 2, 3, 4, 5
LR-LAS-M-91, Sheet 5
LR-LAS-M-94, Sheet 1
LR-LAS-M-95, Sheet 1
LR-LAS-M-101, Sheet 1
LR-LAS-M-115, Sheets 1, 12
LR-LAS-M-137, Sheet 5
LR-LAS-M-140, Sheet 1
LR-LAS-M-141, Sheet 1
LR-LAS-M-147, Sheet 1
LR-LAS-M-159, Sheet 1

Table 2.3.2-4 Residual Heat Removal System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Pressure Boundary
	Throttle
Heat Exchanger - (RHR Heat Exchanger) Shell Side Components	Pressure Boundary
Heat Exchanger - (RHR Heat Exchanger) Tube Sheet	Pressure Boundary
Heat Exchanger - (RHR Heat Exchanger) Tubes	Heat Transfer
	Pressure Boundary
Hoses	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (RHR Pump)	Pressure Boundary
Pump Casing (Water Leg Pump)	Pressure Boundary
Spray Nozzles	Spray
Strainer Element	Filter
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.2.2-4 Residual Heat Removal System
Summary of Aging Management Evaluation

2.3.2.5 Standby Gas Treatment System

Description

The Standby Gas Treatment (SGT) System is a standby system designed to reduce halogen and particulate concentrations in gases leaking from the Primary Containment and which are potentially present in the secondary containment following an accident. The system also provides an alternate means of purging the Primary Containment. The SGT System is in scope for license renewal.

The SGT System is part of secondary containment. When initiated, the system takes suction on the secondary containment, treats the air flowing through the system, and then releases that air to the environment via an elevated release point. The SGT System maintains a slightly negative internal secondary containment pressure to prevent any untreated air leakage from being released to the environment. The SGT System is designed to function during a design basis LOCA with a simultaneous loss of off-site power. During movement of irradiated fuel, the system controls releases from postulated fuel handling accidents. The system is normally in standby, and automatically starts and operates during design basis accidents.

The SGT System is a safety-related system. SGT System equipment is powered from the essential buses and is started either automatically or manually from the control room.

For more detailed information, see UFSAR Sections 6.5.1 and 7.3.8.

Boundary

The SGT System consists of two independent subsystems that are shared between Unit 1 and Unit 2, each with its own set of ductwork, dampers, charcoal filter train, and isolation and control dampers, interconnecting pipes, and associated instrumentation. Each charcoal filter train consists of a filter unit fan and cooling fan, a demister, an electric heater, a prefilter bank, two HEPA filter banks, and a charcoal adsorber. The SGT trains discharge to an exhaust stack located within the plant vent stack. The plant vent stack is evaluated with the Auxiliary Building.

All associated piping, components and instrumentation contained within the boundary described above are also included in the SGT System scoping boundary.

Also included in the SGT System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system, specifically the filter plenum moisture collection and drain pans. Also included in the license renewal scoping boundary of the SGT System are those portions of nonsafety-related piping components relied upon to preserve the structural integrity intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the SGT System scoping boundary are the carbon adsorber filter water deluge spray piping, headers, valves, and temperature detectors. These components perform a fire protection function, and are evaluated with the Fire Protection System.

Reason for Scope Determination

The Standby Gas Treatment System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Standby Gas Treatment System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Standby Gas Treatment System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Standby Gas Treatment System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Control and treat radioactive materials released to the secondary containment. The SGT System maintains a negative pressure within secondary containment, and reduces halogen and particulate concentrations in gases potentially present in the secondary containment following an accident prior to release to the environment. 10 CFR 54.4(a)(1)

2. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The SGT System includes nonsafety-related piping that structurally interacts with safety-related SSCs, and water filled components that have the potential for spatial interactions (spray or leakage) with safety-related SSCs. 10 CFR 54.4(a)(2)

3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Environmental Qualification (10 CFR 50.49). The SGT System contains components that are environmentally qualified. 10 CFR 54.4(a)(3)

UFSAR References

6.5.1
7.3.8

License Renewal Boundary Drawings

LR-LAS-M-89, Sheet 1
LR-LAS-M-92, Sheet 1
LR-LAS-M-105, Sheet 1
LR-LAS-M-138, Sheet 1
LR-LAS-M-153, Sheet 1

Table 2.3.2-5 **Standby Gas Treatment System**
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Ducting and Components	Leakage Boundary
	Pressure Boundary
Flexible Connection	Pressure Boundary
Piping, piping components, and piping elements	Pressure Boundary
	Structural Integrity
Valve Body	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.2.2-5 Standby Gas Treatment System
Summary of Aging Management Evaluation

2.3.3 AUXILIARY SYSTEMS

The following systems are addressed in this section:

- Closed Cycle Cooling Water System (2.3.3.1)
- Combustible Gas Control System (2.3.3.2)
- Compressed Air System (2.3.3.3)
- Control Rod Drive System (2.3.3.4)
- Control Room Ventilation System (2.3.3.5)
- Cranes, Hoists, and Refueling Equipment System (2.3.3.6)
- Demineralized Water Makeup System (2.3.3.7)
- Diesel Generator and Auxiliaries System (2.3.3.8)
- Drywell Pneumatic System (2.3.3.9)
- Electrical Penetration Pressurization System (2.3.3.10)
- Essential Cooling Water System (2.3.3.11)
- Fire Protection System (2.3.3.12)
- Fuel Pool Cooling and Storage System (2.3.3.13)
- Nonessential Cooling Water System (2.3.3.14)
- Nonsafety-Related Ventilation System (2.3.3.15)
- Plant Drainage System (2.3.3.16)
- Primary Containment Ventilation System (2.3.3.17)
- Process Radiation Monitoring System (2.3.3.18)
- Process Sampling and Post Accident Monitoring System (2.3.3.19)
- Radwaste System (2.3.3.20)
- Reactor Water Cleanup System (2.3.3.21)
- Safety-Related Ventilation System (2.3.3.22)
- Standby Liquid Control System (2.3.3.23)
- Suppression Pool Cleanup System (2.3.3.24)
- Traversing Incore Probe System (2.3.3.25)

2.3.3.1 Closed Cycle Cooling Water System

Description

The Closed Cycle Cooling Water System (CCW) is a normally operating closed cooling water system designed to provide cooling water to various plant components.

The CCW consists of the reactor building closed cooling water system and turbine building closed cooling water system. The CCW is in scope for license renewal. However, portions of the CCW are not required to perform intended functions and are not in scope.

The purpose of the reactor building closed cooling water portion of the CCW is to provide cooling water to various components in the Reactor Building, Primary Containment and Off-gas Building. The system accomplishes this by circulating demineralized and chemically treated cooling water through these components and transferring the heat to the plant service water system through the reactor building closed cooling water heat exchangers. The reactor building closed cooling water lines to and from the reactor recirculation pump motor coolers, pump seals, and pump bearings, and drywell penetration cooling coils penetrate the primary containment and are provided with safety-related and environmentally qualified motor operated primary containment isolation valves. The primary containment isolation boundary also includes pressure relief valves to protect the containment penetration piping from overpressurization when it is isolated during a LOCA. The pressure relief valves also function as primary containment isolation valves.

The purpose of the turbine building closed cooling water system portion of the CCW is to provide cooling water to various components in the Turbine Building. The system accomplishes this by circulating demineralized and chemically treated cooling water through these components and transferring the heat to the plants service water system through the turbine building closed cooling water heat exchangers. The turbine building closed cooling water system portion of the CCW does not perform an intended function and is not in scope for license renewal.

For more detailed information see UFSAR Sections 9.2.3 and 9.2.8.

Boundary

The reactor building closed cooling water portion of the CCW license renewal scoping boundary begins at the reactor building closed cooling water pumps and continues through the following Reactor Building heat loads: reactor building equipment drain tank heat exchangers, reactor building process sampling system (evaluated with the Process Sampling System), control rod drive feed pumps, reactor water cleanup non-regenerative heat exchangers, reactor water cleanup pump heat exchangers, reactor building instrument storage room air conditioning unit, drywell pneumatic system compressors and aftercoolers, drywell equipment drain sump heat exchanger, and drywell sump sample pump. The boundary continues from these heat loads through the reactor building closed cooling water heat exchangers prior to returning to the reactor building closed cooling water system pumps. The boundary includes the reactor building closed cooling water expansion tank and reactor building closed cooling water chemical feeder.

The reactor building closed cooling water portion of the CCW license renewal scoping boundary also includes the following primary containment heat loads: reactor recirculation system pump motor coolers, pump seals, and pump bearings (evaluated with the Reactor Coolant Pressure Boundary), and drywell penetration cooling coils. Each primary containment influent and effluent line includes two motor operated containment isolation valves and a pressure relief valve for overpressure protection.

All associated piping, components and instrumentation contained within the boundary described above are also included in the CCW scoping boundary.

Also included in the reactor building closed cooling water portion of the CCW System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building, Primary Containment, and Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the scope of license renewal is the turbine building closed cooling water portion of the CCW System since the turbine building closed cooling water system does not perform or support system intended functions. The turbine building closed cooling water system portion of the CCW does not include pressure-retaining components located in areas where there are potential spatial interactions with components performing safety-related functions, and is not required to maintain leakage boundary integrity to preclude system interaction. Therefore, the turbine building closed cooling water system portion of the CCW is not within the scope of license renewal.

Reason for Scope Determination

The Closed Cycle Cooling Water System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Closed Cycle Cooling Water System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Closed Cycle Cooling Water System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Closed Cycle Cooling Water System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide primary containment boundary. The CCW includes safety-related primary containment isolation valves. 10 CFR 54.4(a)(1)

2. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The CCW contains nonsafety-related water filled lines in the Reactor Building, Primary Containment, and Auxiliary Building which provide structural support or have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The CCW contains components that are environmentally qualified. 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.6.1
Table 3.2-1
6.2.4.2.2
Table 6.2-21
Table 6.2-28
9.2.3
9.2.8
11.5.2.3.5

License Renewal Boundary Drawings

LR-LAS-M-90, Sheets 1, 2, 3
LR-LAS-M-136, Sheets 1, 2, 3
LR-LAS-M-66, Sheets 5, 9, 10, 11
LR-LAS-M-91, Sheets 2, 3, 4, 5
LR-LAS-M-104, Sheet 1
LR-LAS-M-115, Sheets 1, 2
LR-LAS-M-137, Sheets 2, 3, 4, 5
LR-LAS-M-149, Sheet 1
LR-LAS-M-153, Sheets 4, 6
LR-LAS-M-159, Sheets 1, 2

Table 2.3.3-1 Closed Cycle Cooling Water System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Heat Exchanger - (CRD Feed Pump Bearing and Gear Oil Coolers) Tube Side Components	Leakage Boundary
Heat Exchanger - (Clean-up Non-Regenerative Heat Exchanger) Shell Side Components	Leakage Boundary
Heat Exchanger - (Drywell Equipment Drain Sump Heat Exchanger) Shell Side Components	Leakage Boundary
Heat Exchanger - (Drywell Penetration Cooling Coils) Tube Side Components	Leakage Boundary
Heat Exchanger - (Nitrogen Compressor Aftercooler) Shell Side Components	Leakage Boundary
Heat Exchanger - (Nitrogen Compressor Inter-Cooler) Tube Side Components	Leakage Boundary
Heat Exchanger - (RWCU Pump Heat Exchanger) Tube Side Components	Leakage Boundary
Heat Exchanger - (Reactor Building Closed Cooling Water Heat Exchanger) Shell Side Components	Leakage Boundary
Heat Exchanger - (Reactor Building Equipment Drain Tank Heat Exchanger) Shell Side Components	Leakage Boundary
Heat Exchanger - (Reactor Building Ventilation Instrument Room A/C Unit) Tube Side Components	Leakage Boundary
Hoses	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Reactor Building Closed Cooling Water Pump)	Leakage Boundary
Tanks (Reactor Building Closed Cooling Water Chemical Feeder)	Leakage Boundary
Tanks (Reactor Building Closed Cooling Water Expansion Tank)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-1 Closed Cycle Cooling Water System
Summary of Aging Management Evaluation

2.3.3.2 Combustible Gas Control System

Description

The Combustible Gas Control (CGC) System is a standby system designed to ensure that primary containment integrity is not threatened by the possibility of combustion of combustible gases following a LOCA. The CGC System is within the scope of license renewal. However, portions of the CGC System are not required to perform intended functions, and are not included in the scope of license renewal. The purpose of the CGC System includes: inerting primary containment with nitrogen, purging containment with air to permit maintenance, controlling containment pressure, and controlling combustible gas concentrations after a LOCA. The CGC System includes a nitrogen supply system, containment vent and purge system, and a hydrogen recombiner system.

The nitrogen supply system provides a supply of gaseous nitrogen to the primary containment on both units to maintain an inert atmosphere within primary containment. Liquid nitrogen, stored in tanks, is vaporized and provided to either unit in high flow mode for inerting, and in low flow mode for normal makeup, to maintain an inert atmosphere at a slight positive pressure. The nitrogen supply system is nonsafety-related and is not in scope for license renewal since it does not support any intended functions.

The containment vent and purge system can be aligned to supply nitrogen from the nitrogen supply system or air from the Reactor Building to Primary Containment, and to vent displaced containment atmosphere through a purge air filter train or the Standby Gas Treatment System (SGTS) prior to discharge to the environment. During power operation, the containment vent and purge system is manually operated to supply makeup nitrogen to maintain a low oxygen concentration inside primary containment. The containment atmosphere is contained by primary containment isolation valves, and is circulated and cooled by the Primary Containment Ventilation System. During post-accident conditions, the containment vent and purge system can be used to vent containment by manually over-riding isolation signals and aligning the vent flow path to the purge air filter train or the SGTS prior to discharge to the environment. All containment vent and purge system piping connections to the Primary Containment include remotely operated valves that are automatically closed by the Primary Containment Isolation System upon indications of high drywell pressure, low-low reactor water level, or reactor building or spent fuel pool ventilation exhaust high radiation signals. The portions of the containment vent and purge system that maintain the primary or secondary containment boundary are safety-related, designed to seismic Category I requirements, and are in scope for license renewal.

The hydrogen recombiner system is comprised of two redundant hydrogen recombiner packages located outside of primary containment that can service either unit. During post-accident conditions, when hydrogen levels in containment are elevated, flow is established from the drywell air space through a blower that is part of the recombiner package to the suppression chamber air space. This operation provides mixing that prevents combustible concentrations of hydrogen from accumulating in low flow areas within the drywell. The hydrogen recombining function of the hydrogen recombiners is abandoned in place and not credited for reducing hydrogen concentration inside containment. The hydrogen recombiner system includes piping that is part of the primary containment boundary and valves that automatically close upon receipt of signals from the primary containment isolation system. During normal plant operation, the hydrogen recombiners are isolated from containment. The hydrogen recombiner system is safety-related, designed to seismic Category I requirements, and is in scope for license renewal.

For more detailed information, see UFSAR Sections 6.2.5, 7.3.5, 9.4.10, and 9.5.9.

Boundary

The CGC System license renewal scoping boundary begins at the liquid nitrogen storage tanks and includes an electric water bath vaporizer, ambient air vaporizer, high flow and low flow pressure/temperature control stations, and associated piping instrumentation and controls that are located outdoors. The CGC System boundary continues to piping that passes through the Offgas Building to the Reactor Buildings to connections to the drywell and suppression chamber air space. Included in the scoping boundary is the pressure sensing line from the drywell air space to the pressure controller used for nitrogen makeup. The portion of the nitrogen supply system that is outside of the primary containment isolation valves does not support intended functions and is not in scope for license renewal.

The CGC System boundary also includes the drywell and suppression chamber purge air supply piping that is open to the Reactor Building air space, continuing through the primary containment isolation valves to the drywell and suppression chamber air space. Also included is the vent piping from the drywell and suppression chamber air spaces through containment isolation valves to the piping interface with the SGTS and continuing through secondary containment isolation valves to the purge air filter package outlet damper. The portion of the CGC System downstream of the secondary containment isolation valves, including the purge air filter package does not support intended functions and is not in scope for license renewal.

The CGC System boundary also includes the piping from inside the drywell to the hydrogen recombiner packages and back to the suppression chamber air space. Also included is the piping from the Residual Heat Removal System to the hydrogen recombiner packages and loop seals on the discharge of the hydrogen recombiners, including fill connections from the Condensate System and drain connections to the Plant Drainage System.

All associated piping, components and instrumentation contained within the boundary described above are also included in the CGC System scoping boundary.

Also included in the CGC System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the CGC System scoping boundary are the primary containment hydrogen and oxygen analyzers and pressure monitoring instrumentation, including piping connected to CGC System piping, which are evaluated with the Process Sampling and Post Accident Monitoring System. The fire suppression deluge valves for the charcoal filters in the purge air filter train are evaluated with the Fire Protection System. The four vacuum relief valves and associated piping that connects the drywell and suppression chamber air space and all drywell and suppression chamber penetrations with connections to CGC System piping and components are evaluated with the Primary Containment structure.

Reason for Scope Determination

The Combustible Gas Control System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Combustible Gas Control System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Combustible Gas Control System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49) and Station Blackout (10 CFR 50.63). The Combustible Gas Control System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provide primary containment boundary. The Combustible Gas Control System includes piping and isolation valves that form the primary containment boundary. 10 CFR 54.4(a)(1)

2. Provide secondary containment boundary. The Combustible Gas Control System includes piping and isolation valves in the primary containment vent and purge flowpaths that form the secondary containment boundary. 10 CFR 54.4(a)(1)

3. Provide emergency heat removal from primary containment and provide containment pressure control. The Combustible Gas Control System includes flow paths from primary containment that are used to vent primary containment for pressure control. 10 CFR 54.4(a)(1)

4. Control combustible gas mixtures in the primary containment atmosphere. The Combustible Gas Control System is credited with establishing, and maintaining an inert atmosphere within primary containment during power operation. The Combustible Gas Control System also includes equipment that provides mixing of the containment atmosphere to prevent combustible mixtures of hydrogen and oxygen from forming following an accident. 10 CFR 54.4(a)(1)

5. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. Some portions of nonsafety-related piping are relied upon to preserve the structural support intended function of the safety-related piping used for purging, inerting and containment isolation. Some portions of the discharge and drain piping from the hydrogen recombiners may be liquid filled and have a potential for spatial interaction with safety-related equipment within the Reactor Building. 10 CFR 54.4(a)(2)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Combustible Gas Control System includes equipment that is environmentally qualified to remain functional during post-accident conditions. 10 CFR 54.4(a)(3)

7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The Combustible Gas Control System includes primary containment isolation valves that are

required to close to mitigate a Station Blackout event. 10 CFR 54.4(a)(3)

UFSAR References

6.2.5
7.3.5
9.4.10
9.5.9

License Renewal Boundary Drawings

LR-LAS-M-92, Sheets 1, 2
LR-LAS-M-130, Sheets 1, 2
LR-LAS-M-138, Sheets 1, 2
LR-LAS-M-96, Sheets 1, 2
LR-LAS-M-142, Sheets 1, 2

Table 2.3.3-2 Combustible Gas Control System
Components Subject to Aging Management Review

Component Type	Intended Function
Blower Housing	Pressure Boundary
Bolting	Mechanical Closure
Hoses	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Integrity
Recombiners	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary
	Structural Integrity

The aging management review results for these components are provided in:

Table 3.3.2-2 Combustible Gas Control System
Summary of Aging Management Evaluation

2.3.3.3 Compressed Air System

Description

The Compressed Air System (CAS) is a normally operating system designed to provide compressed air for station use. The CAS is in scope for license renewal. However, portions of the CAS are not required to perform intended functions and are not in scope.

The CAS is primarily a nonsafety-related system that is designed for continuous operation. The CAS is composed of two subsystems, the service air plant system and the instrument air plant system. The service air subsystem supplies compressed air for operating pneumatic equipment, air operated controls, maintenance services, and interruptible equipment such as tank mixing air spargers. The instrument air subsystem supplies compressed air for air operated control devices and instruments outside the drywell.

A portion of the CAS system performs a safety-related function. The portion of the service air piping that penetrates Primary Containment and the associated primary containment isolation valves are safety-related components that are relied upon to provide the primary containment boundary.

For more detailed information, see UFSAR Section 9.3.1.

Boundary

The CAS boundary begins at the intake outside the Turbine Building, proceeds through three compressor trains which include intake filters and coolers, and discharges to a common header which supplies the station air receivers. Compressed air from the receivers is directed to one of three filter and dryer trains, and is then discharged to the instrument air and service air headers where it is distributed throughout the plant for various station uses.

The portion of the CAS which is in scope for license renewal is the portion that penetrates Primary Containment and the associated primary containment isolation valves and piping.

All associated piping, components, and instrumentation contained within the boundary described above are also included in the CAS System scoping boundary.

Also included in the CAS System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor. Included in this boundary are those portions of nonsafety-related piping and equipment relied upon to preserve the structural integrity intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the CAS System scoping boundary are the containment penetrations which are evaluated with the Primary Containment structure.

Not included in the scope of license renewal is the portion of the CAS that is nonsafety-related and is not located in areas where there are potential spatial interactions with components performing safety-related functions, and therefore is not relied upon to perform or support any system intended function.

Reason for Scope Determination

The Compressed Air System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Compressed Air System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Compressed Air System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide primary containment boundary. The CAS contains safety-related primary containment isolation valves and piping which penetrates the primary containment. 10 CFR 54.4(a)(1)

2. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The CAS includes nonsafety-related piping and components that have the potential for structural interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

9.3.1.2.1

License Renewal Boundary Drawings

LR-LAS-M-82, Sheets 3, 5

Table 2.3.3-3 Compressed Air System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Pressure Boundary
	Structural Integrity
Valve Body	Pressure Boundary
	Structural Integrity

The aging management review results for these components are provided in:

Table 3.3.2-3 Compressed Air System
Summary of Aging Management Evaluation

2.3.3.4 Control Rod Drive System

Description

The Control Rod Drive (CRD) System is a normally operating, high pressure hydraulic system designed to rapidly insert all control rods into the core in response to manual or automatic signals from the Reactor Protection System or the plant alternate rod insertion (ARI) system which is included with the license renewal Reactivity Control System. The CRD System also incrementally positions control rods in response to signals from the plant rod control management system which is included with the license renewal Reactivity Control System. The CRD System is in scope for license renewal. However, portions of the system are not required to perform intended functions and are not in scope.

The primary safety-related purpose of the CRD System is to support rapid insertion of negative reactivity into the reactor core to shut down the reactor under accident or transient conditions by simultaneously inserting all control rods. The CRD System is also used to manage core reactivity and control reactor power during normal reactor operation by inserting or withdrawing control rods at a controlled rate, one rod at a time. The CRD System accomplishes these functions by providing water at the required operating pressures to the control rod drive mechanisms in response to inputs from the Reactor Protection System, and the license renewal Reactivity Control System. The CRD System also supplies makeup to the reactor vessel water level reference leg condensing chambers and a low flow rate of cool, clean, high pressure purge water to reactor recirculation pump seals and reactor water cleanup pumps.

The CRD System is comprised of the control rod drive hydraulic system including hydraulic control units HCUs), scram discharge volume, and the scram air header.

The control rod drive hydraulic system includes two control rod drive water pumps, filters, valves, piping components, and associated instrumentation. The pumps provide cool clean high pressure water to a flow control station, to the HCUs via the charging water header, the drive water header, and the cooling water header, each at a different pressure. The control rod drive hydraulic system is arranged so that the equipment supporting each control rod drive mechanism is packaged into modular HCUs, one for each control rod drive mechanism. The HCUs receive electrical control signals from the Reactivity Control System or Reactor Protection System and direct water to and from the control rod drive mechanisms to move the control rods accordingly. The charging water header maintains the HCU accumulators charged and ready to support rapid control rod insertion in the event of a scram signal. Stored energy available from the nitrogen charged accumulators and from reactor pressure provide hydraulic energy for rapid simultaneous insertion of control rods. The drive water header provides the control rod drive mechanisms with motive force for positioning the control rods individually to manage core reactivity. The cooling water header provides a constant flow of water to cool the control rod drive mechanisms to maximize the life of internal seals and maintain acceptable scram insertion times. An exhaust water header interconnects the HCUs to provide a flowpath from the HCU associated with an individual control rod drive mechanism being operated to other HCUs back to the reactor vessel via other control rod drive mechanisms.

The scram air header provides a filtered pneumatic supply to scram inlet and outlet valve actuators via the scram solenoid pilot valves and the scram discharge volume vent and drain valve actuators. The scram air header is supplied with instrument air from the Compressed Air

System. During a scram, scram solenoid pilot valves de-energize to open scram inlet and outlet valves on each HCU to permit stored energy in the hydraulic control unit accumulators and reactor pressure to supply high pressure water to the drive mechanisms causing the control rods to rapidly insert. Also, solenoid valves on the scram air header energize to isolate it from the instrument air supply system and vent it to atmosphere upon receipt of a scram signal from the Reactor Protection System or via actuation from the plant ARI system.

During a scram, each HCU discharges water from the control rod drive mechanisms via the scram outlet valves into the scram discharge volume. The scram discharge volume consists of a header that drains to an instrument volume consisting of a vertical pipe with water level instrumentation. The scram discharge volume vent and drain valves automatically isolate during a scram to contain potentially contaminated water from the reactor vessel and to maintain vessel inventory. The scram discharge volume is maintained vented and drained during normal plant operation and following reset of the scram signal.

For more detailed information, see UFSAR Section 4.6.

Boundary

The CRD System scoping boundary includes piping to and from the control rod drive mechanism flanges at the reactor vessel penetrations to the HCUs and back through the scram outlet valves to the scram discharge volume, including the scram instrument volume, level instruments and vent and drain valves. The CRD System scoping boundary also includes the scram air header beginning at the air supply filter and continuing to the back-up scram solenoid valves, solenoid valves actuated by the ARI system, scram solenoid pilot valves located on each HCU, and scram discharge volume vent and drain solenoid valves. Also included within the CRD System is a nitrogen bottle station and piping network that routes pressurized nitrogen to the HCUs that is manually connected to charge the accumulators.

The solenoid valves that operate the scram inlet and outlet valves, scram discharge volume vent and drain valves and vent the scram air header upon actuation from the Reactor Protection System or the plant ARI system have an active safety-related function and are within the scope of license renewal. However, these solenoid valves do not have pressure-retaining or other passive intended function; and therefore are not subject to aging management review.

All associated piping, components, and instrumentation contained within the boundary described above are included in the CRD System scoping boundary.

Also included in the CRD System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building and Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the CRD System scoping boundary are the control rod drive housings and stub tubes that are evaluated with the Reactor Vessel System, and the control rod drive mechanisms and control rod blades that are evaluated with the Reactor Vessel Internals System.

Not included in the scope of license renewal is the scram air header which is nonsafety-related, and does not perform or support an intended function. Not included in the scope of license renewal is the nitrogen bottle station and piping network that routes pressurized nitrogen to the HCUs to charge accumulators which is nonsafety-related, and does not perform or support an intended function.

Reason for Scope Determination

The Control Rod Drive System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Control Rod Drive System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Control Rod Drive System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Introduce negative reactivity to achieve or maintain subcritical reactor condition. The HCUs provide the motive force to the control rod drive mechanisms to rapidly insert control rods during a scram event. The scram discharge volume provides a low pressure sink for water discharged from the above piston area of control rod drive mechanisms during a scram event. 10 CFR 54.4(a)(1)

2. Provide primary containment boundary. The directional control valves on the HCUs provide containment isolation function from the CRD insert and withdrawal lines. 10 CFR 54.4(a)(1)

3. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The scram discharge volume includes level instrumentation that causes actuation of the Reactor Protection System upon a high water level condition. Pressure switches on the charging water header cause actuation of the Reactor Protection System upon a low pressure signal when reactor pressure is low and control rods are withdrawn. 10 CFR 54.4(a)(1)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The CRD System includes nonsafety-related water filled, pressure-retaining piping and equipment within the Reactor Building and Auxiliary Building that have the potential for spatial and structural interaction with safety-related equipment. 10 CFR 54.4(a)(2)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The CRD System includes equipment that is credited by Fire Safe Shutdown analysis to shutdown the reactor via the scram function. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The CRD System includes instrumentation and equipment that is required to be environmentally qualified. 10 CFR 54.4(a)(3)

7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without SCRAM (10 CFR 50.62). The CRD System includes solenoid valves that receive signals from the plant ARI system to provide an alternate means of venting the scram air header and cause insertion of control rods. 10 CFR 54.4(a)(3)

8. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The station blackout analysis credits the CRD System with successfully inserting all control rods upon receipt of scram initiation signals from the Reactor Protection System. 10 CFR 54.4(a)(3)

UFSAR References

Table 3.2-1
3.9.4
4.6.1
4.6.2
Table 6.2-21
7.7.2.2

License Renewal Boundary Drawings

LR-LAS-M-90, Sheet 3
LR-LAS-M-91, Sheets 5, 6
LR-LAS-M-93, Sheets 1, 2
LR-LAS-M-100, Sheets 1, 2, 3, 4, 5
LR-LAS-M-104, Sheet 1
LR-LAS-M-136, Sheet 3
LR-LAS-M-137, Sheets 5, 6
LR-LAS-M-139, Sheets 1, 2
LR-LAS-M-146, Sheets 1, 2, 3, 4, 6
LR-LAS-M-149, Sheet 1
LR-LAS-M-2100, Sheet 2
LR-LAS-M-2146, Sheet 2

Table 2.3.3-4 <u>Control Rod Drive System</u>
Components Subject to Aging Management Review

Component Type	Intended Function
Accumulator	Pressure Boundary
Bolting	Mechanical Closure
Drip Pan	Leakage Boundary
Gearbox (CRD Pump)	Leakage Boundary
Heat Exchanger - (CRD Feed Pump Bearing and Gear Oil Cooler) Shell Side Components	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (CRD Pump)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-4 Control Rod Drive System
Summary of Aging Management Evaluation

2.3.3.5 Control Room Ventilation System

Description

The Control Room Ventilation (CRV) system is a normally operating system designed to ensure habitability inside the control rooms and auxiliary electrical equipment rooms during all normal and abnormal station operating conditions. The CRV ensures that the control room operators are safe against postulated releases of radioactive materials, noxious gases, smoke, and steam. In addition the environment in the control rooms and auxiliary electrical equipment rooms is maintained in order to ensure the integrity of the contained safety-related controls and equipment during all station operating conditions. The CRV license renewal system consists of the control room area ventilation plant system, the auxiliary electric equipment room ventilation plant system, the refrigeration plant system, and the breathing air plant system. The CRV system is in scope for License Renewal.

Control Room Area Ventilation subsystem

The purpose of the control room area ventilation plant system is to maintain a habitable environment and to ensure the operability of the safety-related components in the control room, main security control center, control room east area and control room toilet under all station normal and abnormal operating conditions. These abnormal conditions are ammonia and high radiation detection at outside air intakes, and smoke detection in return air ducts and outside air intake. The system accomplishes this using emergency makeup air filter units and recirculating air filter units, which provide and recirculate clean filtered makeup air in cases where the outside air is contaminated.

The system is designed to Seismic Category I requirements with the exception of heating equipment which is not Seismic Category I, but is seismically supported. The heating equipment is not essential to the safety of operating personnel or the function of safety-related equipment.

The control room area ventilation plant system is normally provided with filtered outdoor air, at a quantity sufficient to maintain positive pressure compared to surrounding areas at all times except in the recirculation mode. The positive pressure inside the control room precludes infiltration of potentially contaminated air into the conditioned space.

Auxiliary Electric Equipment Room Ventilation subsystem

The purpose of the auxiliary electric equipment room ventilation plant system is to provide habitability in the auxiliary electric equipment rooms during both normal and abnormal station conditions. The system accomplishes this by aligning to the same emergency makeup filter units utilized by the control room area ventilation plant system, to provide and recirculate clean filtered makeup air in cases where outside air is contaminated. The auxiliary electric equipment room ventilation subsystem contains its own recirculating filter units.

The system is designed to Seismic Category I requirements with the exception of heating equipment which is not Seismic Category I, but is seismically supported. The heating equipment is not essential to the safety of operating personnel or the function of safety-related equipment.

The auxiliary electric equipment room ventilation plant system is normally provided with filtered outdoor air, at a quantity sufficient to maintain positive pressure compared to surrounding areas at all times except in the recirculation mode. The positive pressure inside the equipment rooms precludes infiltration of potentially contaminated air into the conditioned space.

Refrigeration subsystems

The purpose of the control room and auxiliary electric equipment room refrigeration plant subsystems is to provide cooling for each of the control room area and auxiliary electric equipment room ventilation air handling systems. The systems accomplish this through the use of cooling coils mounted in an air handling unit, a compressor unit, an air cooled condenser, a refrigerant receiver, and interconnected piping and associated equipment.

Breathing Air subsystem

The purpose of the breathing air plant system is to provide emergency breathing air to control room personnel. The system accomplishes this through cylinders with appropriate pressure regulators, low pressure alarms and face masks.

For more detailed information, see UFSAR Sections 6.4, 6.5.1, 9.4.1.1, and 9.4.1.2.

<u>Boundary</u>

The CRV license renewal system boundary begins at the outside air intakes, proceeds through the supply air fan and filter trains to the control and auxiliary equipment rooms, discharges through the return fans back into the supply fan inlet or to the discharge in the Auxiliary Building, and includes the associated ductwork, piping, instrumentation and controls. The system includes the emergency makeup fan and filter train, the refrigeration system components, and associated ductwork, instrumentation and controls.

All associated piping, components, and instrumentation contained within the boundary described above are also included in the CRV System scoping boundary.

Also included in the CRV System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the CRV System scoping boundary is the charcoal filter bank fire detection instrumentation and associated deluge valve sprinkler systems support. These components perform a fire protection function, and are evaluated with the Fire Protection license renewal system. Additionally, the fire protection function of fire dampers is evaluated with the Fire Protection System. Also not included in the CRV System scoping boundary is the ventilation intake radiation monitoring instrumentation which is evaluated with the Process Radiation Monitoring license renewal system.

Reason for Scope Determination

The Control Room Ventilation System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Control Room Ventilation System is not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Control Room Ventilation System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Control Room Ventilation System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provide centralized area for control and monitoring of nuclear safety-related equipment. The primary purpose of the CRV system is to maintain environmental conditions and ensure the safety and comfort of operating personnel in the control room. The system also monitors for the presence of ammonia, radioactive contamination, and smoke; and provides a filtered fresh air supply as necessary in response to these conditions. 10 CFR 54.4(a)(1)

2. Maintain emergency temperature limits within areas containing safety-related components. The CRV system maintains environmental conditions to ensure that the operability of safety-related equipment in the control rooms and auxiliary electric equipment rooms. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Control Room Ventilation System contains nonsafety-related liquid-filled components, specifically the cooling coil drip pans, which have the potential for spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The CRV system is relied upon to maintain a habitable environment and ensure the operability of safety-related components in the control rooms and auxiliary equipment rooms during a Fire Safe Shutdown event. 10 CFR 54.4(a)(3)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The CRV system contains components that are environmentally qualified. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The CRV system is relied upon to maintain a habitable environment and ensure the operability of safety-related components in the control rooms and auxiliary electrical equipment rooms during SBO recovery. 10 CFR 54.4(a)(3)

UFSAR References

1.2.3.6.6
6.4
6.5.1
9.4.1.1
9.4.1.2
7.3.4
6.4.1.c

License Renewal Boundary Drawings

LR-LAS-M-1443, Sheets 1, 2, 3, 4
LR-LAS-M-1455, Sheet 1
LR-LAS-M-1468, Sheets 3, 4, 5, 6
LR-LAS-M-1470, Sheet 1
LR-LAS-M-129, Sheets 2, 3
LR-LAS-M-151, Sheet 4

Table 2.3.3-5 Control Room Ventilation System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Ducting and Components	Leakage Boundary
	Pressure Boundary
Flexible Connection	Pressure Boundary
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Air-Cooled Condenser) Fins	Heat Transfer
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Air-Cooled Condenser) Shell Side Components	Pressure Boundary
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Air-Cooled Condenser) Tubes	Heat Transfer
	Pressure Boundary
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Supply Coolers) Fins	Heat Transfer
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Supply Coolers) Shell Side Components	Pressure Boundary
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Supply Coolers) Tubes	Heat Transfer
	Pressure Boundary
Heat Exchanger - (Control Room and Aux Equip Room HVAC Refrigerant Compressor Oil Cooler) Shell Side Components	Pressure Boundary
Heat Exchanger - (Control Room and Aux Equip Room HVAC Refrigerant Compressor Oil Cooler) Tubes	Heat Transfer
	Pressure Boundary
Piping, piping components, and piping elements	Pressure Boundary
Tanks (Control Room and Aux Elec Equip Room HVAC Refrigerant Receiver)	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-5 Control Room Ventilation System
Summary of Aging Management Evaluation

2.3.3.6 Cranes, Hoists and Refueling Equipment System

Description

The Cranes, Hoists and Refueling Equipment System is a standby system comprised of load handling bridge cranes, jib cranes, lifting devices, monorails, and hoists provided throughout the facility designed to support operation and maintenance activities. Also included are equipment that handles fuel and other light loads above fuel and other safety-related components in support of reactor refueling. The Cranes, Hoists and Refueling Equipment System is in scope for license renewal. However, portions of the Cranes, Hoists and Refueling Equipment System are not required to perform intended functions and are not in scope.

The purpose of the Cranes, Hoists and Refueling Equipment System is to safely move material and equipment to support operations and maintenance activities. The Cranes, Hoists and Refueling Equipment System accomplishes this through compliance with NUREG-0612 and administrative controls such that damage from a postulated heavy load drop does not prevent safe shutdown of the reactor.

The reactor building crane services the common refueling floor for both units, and is used to lift heavy loads including the drywell head, the reactor vessel head, vessel internals, and spent fuel casks. The reactor building crane is safety-related, designed to be single failure proof in conformance with NUREG-0554 and NUREG-0612, and is designed as Seismic Category 1. Included in the Cranes, Hoists and Refueling Equipment System are load handling systems throughout the facility. Cranes and hoists that handle loads over safety-related systems, structures and components are in scope for license renewal. Postulated failure of these cranes and hoists could impact a safety-related function. As a result, the reactor building crane, approximately 60 cranes and hoists, and numerous rigging beams are in scope for license renewal.

The refueling platform for each unit; including the fuel grapple hoist, frame mounted hoist, and trolley mounted hoist that are mounted on each refueling platform which are used to handle fuel and other light loads over the spent fuel pool and over the reactor vessel during refueling are in scope for license renewal. The scorpion work platform with installed jib cranes is also used to support refueling operations, handle light loads over the reactor cavity, and is therefore in scope. Also included in scope for license renewal are the fuel preparation machines that are mounted on the wall of each spent fuel pool. The fuel preparation machines are used to handle new and irradiated fuel bundles and remove and install fuel channels.

For more detailed information, refer to UFSAR Section 9.1.4 and Appendix O.

Boundary

The Cranes, Hoists and Refueling Equipment System scoping boundary includes all the cranes, hoists, rigging beams on the LaSalle County Station site. Also included is equipment used to move fuel, service the reactor vessel and internal components, and tools associated with refueling operations. The cranes, hoists, rigging beams and refueling equipment that have the potential to handle loads above safety-related components or fuel, as described in the system description, are within the scope of license renewal.

The concrete and steel structures that provide structural support for crane and hoist components are evaluated with the structure that supports the crane or hoist.

The scoping boundary for in scope cranes, hoists and refueling equipment is limited to load bearing structural components such as the bridge, trolley, rail system (rails and rail fasteners), structural bolts, monorail beams, and jib crane structural members. Cranes, hoists, and refueling equipment that do not have the potential to handle loads over safety-related components or fuel are not included in the scope of license renewal. Equipment used to service and inspect fuel and reactor vessel and internal components, including engineered tools that are suspended from cranes or hoists is not included in the scope of license renewal.

Reason for Scope Determination

The Cranes, Hoists and Refueling Equipment System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Cranes, Hoists and Refueling Equipment System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Cranes, Hoists and Refueling Equipment System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provides physical support, shelter and protection for safety-related systems, structures, and components. The reactor building crane is safety-related, seismically qualified, and is used to transport heavy loads over irradiated fuel and above or near safety-related components. 10 CFR 54.4(a)(1)

2. Provides a safe means for handling safety-related components and loads above or near safety-related components. The Cranes, Hoists and Refueling Equipment System components within the scope of license renewal handle equipment or fuel above or near safety-related components or spent fuel. 10 CFR 54.4(a)(2)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The nonsafety-related cranes, hoists and refueling equipment that are in scope provide a safe means for handling loads above or near safety-related components. 10 CFR 54.4(a)(2)

UFSAR References

9.1.4
Appendix O
Table 3.2-1

License Renewal Boundary Drawings

None.

Table 2.3.3-6 **<u>Cranes, Hoists and Refueling Equipment System</u>**
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Structural Integrity
Crane/Hoist (Bridge/Girders/Trolley/Beam/Jib Boom)	Structural Integrity
Crane/Hoist (Fuel Prep Machine)	Structural Integrity
Crane/Hoist (Rail Systems)	Structural Integrity
Crane/Hoist (Refueling Platform)	Structural Integrity
Crane/Hoist (Scorpion Work Platform)	Structural Integrity

The aging management review results for these components are provided in:

Table 3.3.2-6 Cranes, Hoists and Refueling Equipment System
Summary of Aging Management Evaluation

2.3.3.7 Demineralized Water Makeup System

Description

The intended function of the Demineralized Water Makeup System for license renewal is to maintain leakage boundary integrity to preclude system interactions. For this reason, this system's pressure-retaining components located in areas where there is potential spatial interaction with components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope only for potential spatial interaction.

The Demineralized Water Makeup System is a normally operating system designed to provide water from on-site wells, purify the stored well water, and provide it for various uses throughout the plant, including potable and domestic use and high purity reactor grade water for makeup to the clean and cycled condensate storage tanks and various plant systems. The Demineralized Water Makeup System consists of the following plant systems: domestic water, makeup demineralizer, and well water. The Demineralized Water Makeup System is in scope for license renewal. However, portions of the Demineralized Water Makeup system are not required to perform or support intended functions and are not included in the scope of license renewal.

Well Water System

The purpose of the well water system is to provide a source of ground water to supply plant needs. The well water system accomplishes this by pumping water from two on-site deep wells, filtering the water through trailer mounted sand filters to remove iron, manganese, and suspended matter, for storage in the 350,000 gallon well water storage tank.

Makeup Demineralizer System

The purpose of the makeup demineralizer system is to purify the water stored in the well water storage tank and make it suitable for use for makeup to the clean and cycled condensate storage tanks. The makeup demineralizer system accomplishes this by using trailer mounted demineralizers and filters to purify water to meet reactor grade water quality requirements. A portion of the original demineralized water makeup system is abandoned in place and the regeneration capability of the makeup demineralizers has been removed.

Domestic Water System

The purpose of the domestic water system is to provide potable water for domestic use on site. The domestic water system accomplishes this by processing water from the well water storage tank. Water for domestic consumption is chlorinated and filtered to meet drinking water standards.

For more detailed information see UFSAR Sections 1.2.3.6.4, 2.4.13.1.3, 9.2.4, and 9.2.5.

Boundary

The license renewal scoping boundary of the Demineralized Water Makeup System encompasses the liquid filled portions of nonsafety-related piping and equipment located in areas where there is potential spatial interaction with safety-related equipment. This includes the nonsafety-related portions of the system located within the Reactor Buildings and the Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this system. This includes the demineralized water supply line to the Nonessential Cooling Water System clean gland water storage tank and HVAC evaporative coolers and humidifiers in the Auxiliary Building and the domestic water distribution piping in the Reactor Buildings and Auxiliary Building. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

The cycled condensate storage tanks are evaluated with the Condensate license renewal system. The inactive portions of the system that do not perform or support an intended function and are not located in areas where there are potential spatial interactions with components performing safety-related functions, are not included in the scope of license renewal.

Reason for Scope Determination

The Demineralized Water Makeup System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety-related or relied upon to remain functional during and following design basis events. The Demineralized Water Makeup System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Demineralized Water Makeup System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), or Station Blackout (10 CFR 50.63).

Intended Functions

1. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Demineralized Water Makeup System contains nonsafety-related liquid-filled lines in the Reactor Building and Auxiliary Building which have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

1.2.3.6.4
2.4.13.1.3
9.2.4
9.2.5
9.4.3.4.2
9.4.4.2
10.4.7.2

License Renewal Boundary Drawings

LR-LAS-M-76, Sheet 4
LR-LAS-M-77, Sheet 1
LR-LAS-A-615, Sheet 1
LR-LAS-A-616, Sheet 1
LR-LAS-A-617, Sheet 1
LR-LAS-A-595, Sheet 1
LR-LAS-M-1455, Sheet 1
LR-LAS-M-1456, Sheet 1
LR-LAS-M-1459, Sheet 1
LR-LAS-M-1460, Sheet 1

Table 2.3.3-7 Demineralized Water Makeup System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Heat Exchanger - (Electric Hot Water) Shell Side Components	Leakage Boundary
Heat Exchanger- (Steam Generator) Shell Side Components	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
Pump Casing (Evaporative Cooler)	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in:

Table 3.3.2-7 Demineralized Water Makeup System
Summary of Aging Management Evaluation

2.3.3.8 Diesel Generator and Auxiliaries System

Description

The Diesel Generator and Auxiliaries System is a standby system designed to provide sufficient electrical power to important plant equipment when normal offsite power sources are not available. The Diesel Generator and Auxiliaries System consists of the following plant systems: diesel generator system, diesel oil transfer system, fire seals and fuel storage, and the technical support center diesel. The Diesel Generator and Auxiliaries System also includes the security diesel. The Diesel Generator and Auxiliaries System is in scope for license renewal. However, portions of the Diesel Generator and Auxiliaries System are not required to perform intended functions and are not included in the scope of license renewal.

The purpose of the Diesel Generator and Auxiliaries System is to provide a source of electrical power which is not dependent on off-site sources and which is capable of supplying sufficient power to those electrical loads which are required to support the simultaneous safe shutdown of both units, coincident with a loss-of-coolant accident on one unit. The Diesel Generator and Auxiliaries System is designed for physical separation and redundancy such that no single active failure can prevent the system from performing its safety-related function, and to remain functional during and following a SSE seismic event. The Diesel Generator and Auxiliaries System utilizes five diesel engines to power electric generators. The system includes two diesel generators for each LaSalle unit, and a diesel generator that can be aligned to busses that supply power to loads on both units. One of the diesel generators for each unit has the primary purpose to supply emergency power to the high pressure core spray (HPCS) pump motor.

Each diesel generator is located in a separate room that is equipped with an independent ventilation system that provides combustion air and removes heat from equipment in the room to assure reliable operation of the diesel generator and associated equipment. The ventilation system is evaluated for license renewal under the Safety-Related Ventilation System. The design of the rooms prevents the possibility of a missile or explosion, or a fire affecting one diesel generator, from affecting another diesel generator. Each diesel generator includes self-contained auxiliary support systems that include starting air, closed cooling water, engine lubricating oil, combustion air intake and exhaust, and diesel fuel oil storage and transfer.

The starting air system consisting of two independent starting air subsystems that supply pressurized air to pneumatic starting motors that roll the engine until it starts. The safety function of the starting air auxiliary system is to provide for reliable starting of the diesel generators. The combustion air intake system provides combustion air that is adequately filtered and at the proper temperature and pressure. The exhaust system discharges exhaust gases outside of the diesel room to support continuous engine operation at full load. The auxiliary closed cooling water system provides cooling to the engine cylinder jackets, lube oil, and combustion air to support continuous engine operation under all loading conditions. Heat is rejected from the closed cooling water system by the diesel generator cooling water pumps that circulate water from the cooling lake through the closed cooling water heat exchangers.

The lubrication oil system provides a continuous flow of filtered lube oil to diesel engine components at a controlled pressure and temperature to support all engine functions. The lube oil system consists of four subsystems; the main lube oil system, scavenging oil system, piston cooling system, and oil circulating and soak-back system. The main lube oil system supplies pressurized oil to various moving parts within the engine, including the turbocharger.

The scavenging oil system provides cooled and filtered oil to the main lube oil and piston cooling systems. The piston cooling system supplies pressurized oil to the piston pin bearings and cylinders. The oil circulating and soak-back system supplies warm oil during standby conditions to engine components in support of rapid engine start and loading.

The fuel oil storage, transfer and delivery system provides a sufficient volume of clean, high quality fuel to support seven days of continuous operation following all design bases accidents. The fuel oil system also includes the fuel storage, transfer and delivery system for the two diesel-driven fire pumps that is interconnected to the HPCS diesel storage tanks. The fuel oil system for the fire pumps is nonsafety-related but supports compliance with regulations for Fire Protection by supporting the distribution of water used for suppression of fires.

The fuel oil system also includes the fuel storage, transfer, and delivery system for the security diesel generator and Technical Support Center diesel generator. These fuel oil systems are independent of the fuel oil systems that supply fuel to the five emergency diesel generators and the diesel-driven fire pumps.

For more detailed information, see UFSAR Sections 7.3.6, 8.3.1 and 9.5.4 through 9.5.8.

Boundary

The Diesel Generator and Auxiliaries System license renewal scoping boundary encompasses the five diesel engines that provide a source of electrical power which is not dependent on off-site sources and are required to support the simultaneous safe shutdown of both units, including components within the following auxiliary system flow paths for each engine: starting air, combustion air intake and exhaust, cooling water, engine lubricating oil, and diesel fuel oil storage and transfer.

There are two redundant starting air systems for each diesel engine. Each redundant starting air system scoping boundary begins at the air compressor and continues through the moisture separator, air dryer and check valve to two air receiver tanks. The air compressors, moisture separators and air dryers are nonsafety-related. The check valve and flow path through the air receivers to the engine are safety-related. The scoping boundary continues from the air receivers through a pressure regulator valve, strainer, air start solenoid valve, to two pneumatic starting motors. The pneumatic starting motors are part of the complex active diesel engine assembly, and are therefore not subject to aging management review. All associated piping, components, and instrumentation contained within the described flow path are included in the system evaluation boundary.

The combustion air intake system scoping boundary begins at the air intake filter located downstream of the inlet louver bank associated with the diesel room ventilation system. The scoping boundary continues to a flexible hose to the diesel engine. The diesel exhaust system scoping boundary begins at the diesel engine and continues through an expansion bellows, exhaust silencer, and exhaust pipe to a screen grating above the diesel room roof.

The closed cooling water system scoping boundary begins at the engine cooling water heat exchanger and continues through the lube oil cooler through the engine-driven cooling water pumps to the engine water inlet manifolds and turbocharger aftercoolers. The scoping boundary continues from the engine to a temperature regulating valve back to the engine cooling water heat exchanger. An expansion tank, immersion heater, and all associated piping, components, and instrumentation contained within the described flow path are included in the system evaluation boundary. The engine-driven cooling water pumps, engine water inlet manifolds, and aftercoolers are part of the complex active diesel engine assembly, and are therefore not subject to aging management review.

The lubricating oil system consists of four subsystems; the main lube oil system, scavenging oil system, piston cooling system, and oil circulating and soak-back system. The main oil lubrication system scoping boundary begins at the lube oil strainer tank and continues through a strainer, to the engine-driven main oil pump to the main lube oil manifold and through the turbocharger filter assembly to the turbocharger, and to the engine sump. The scavenging oil system scoping boundary begins at the engine sump and continues through a strainer to the engine-driven scavenging oil pump, through a filter, the lube oil cooler and to the lube oil strainer tank. The piston cooling system scoping boundary begins at the suction piping to the main oil pump and continues to the engine-driven piston cooling oil pump and to the engine. The oil circulating and soak-back system scoping boundary begins at the engine sump and continues to the AC motor- powered circulating oil pump, soak-back oil pump, and DC motor-powered backup soak-back oil pump. The scoping boundary continues downstream of the circulating oil pump to the discharge of the scavenging oil pump filter, and to a common header with the soak-back pumps, through the soak-back filter, and to the turbocharger bearings. The engine-driven main, scavenging and piston cooling oil pumps, lube oil manifold, turbocharger filter assembly, turbocharger, and engine sump are part of the complex active diesel engine assembly, and are therefore not subject to aging management review. All associated piping, components, and instrumentation contained within the described flow path are included in the system evaluation boundary.

The diesel fuel oil storage and transfer system scoping boundary begins at the fill line to the diesel fuel storage tank for each engine and continues through a strainer to the fuel oil storage tank. The scoping boundary continues from the fuel oil storage tank through a strainer to a fuel transfer pump to the diesel generator day tank. The scoping boundary continues from day tank through a strainer to the fuel pump and through a duplex filter to the fuel injectors associated with the diesel engine. The strainer in the suction to the fuel pump, fuel pump, duplex filter, and fuel injectors are part of the complex active diesel engine assembly, and are therefore not subject to aging management review. All associated piping, components, and instrumentation contained within the described flow path are included in the system evaluation boundary.

The diesel fuel oil storage and transfer system scoping boundary for the diesel-driven fire pumps begins at the HPCS diesel fuel storage tank and continues through a strainer to a fuel transfer pump to the diesel fire pump day tank. The scoping boundary continues from day tank to the diesel engine. All associated piping, components, and instrumentation contained within the described flow path are included in the system evaluation boundary.

The diesel fuel oil storage and transfer system scoping boundary for the security diesel and Technical Support Center diesel begins at the common fuel storage tank fill connection and continues to the fuel storage tank, security diesel day tank, Technical Support Center diesel day tank, and to the security diesel engine and the Technical Support Center diesel engine. All associated piping, components, and instrumentation contained within the described flow path are included in the system evaluation boundary.

Also included in the Diesel Generator and Auxiliaries System license renewal scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related to nonsafety-related interface up to the location of the first seismic anchor. This includes the nonsafety-related portions of the system located in the diesel rooms. Also included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the Diesel Generator and Auxiliaries System scoping boundary is the diesel room ventilation system which is evaluated with the Safety-Related Ventilation System.

Not included in the Diesel Generator and Auxiliaries System scoping boundary are the diesel generator cooling water pumps and the tube side of the engine cooling water heat exchanger which are evaluated with the Essential Cooling Water System.

Not included in the Diesel Generator and Auxiliaries System scoping boundary are the diesel-driven fire pump engines and components not associated with the fuel oil supply system which are evaluated with the Fire Protection System.

Not included in the scope of license renewal are the components associated with the security and Technical Support Center diesels and fuel oil systems since they do not perform or support an (a)(1) or (a)(3) intended function, and are not connected to or located in areas where there are potential spatial interactions with safety-related components.

Reason for Scope Determination

The Diesel Generator and Auxiliaries System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Diesel Generator and Auxiliaries System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Diesel Generator and Auxiliaries System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Diesel Generator and Auxiliaries System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provide motive power to safety-related components. The Diesel Generator and Auxiliaries System is required to power safety-related equipment in the event normal offsite power sources are not available. 10 CFR 54.4(a)(1)

2. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Diesel Generator and Auxiliaries System includes nonsafety-related fluid filled lines in the diesel rooms that have the potential for spatial interactions with safety-related SSCs. The starting air system includes nonsafety-related piping that is in scope to provide a seismic anchor credited for structural support of safety-related piping. 10 CFR 54.4(a)(2)

3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The

Diesel Generator and Auxiliaries System provides an alternate power source required to cope with a station blackout event to support safe shutdown and decay heat removal for the blacked out unit for the required coping duration. 10 CFR 54.4(a)(3)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Diesel Generator and Auxiliaries System provides power to safe shutdown equipment in the event of a loss of offsite power coincident with the postulated fire for several analyzed Fire Safe Shutdown methods. The Diesel Generator and Auxiliaries System also provides the fuel oil supply to the diesel-driven fire water pumps that support the distribution of water used for fire suppression. 10 CFR 54.4(a)(3)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Diesel Generator and Auxiliaries System includes safety-related components located within areas of the plant that may have harsh environments, and therefore have environmental qualifications. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

Table 3.2-1
7.3.6
8.3.1
9.5.4 through 9.5.8

<u>License Renewal Boundary Drawings</u>

LR-LAS-M-83, Sheets 1, 2, 3, 4
LR-LAS-M-85, Sheet 1
LR-LAS-M-132, Sheet 1
LR-LAS-M-105, Sheet 3
LR-LAS-M-150, Sheet 2
LR-LAS-M-EDGECW, Sheet 1

Table 2.3.3-8 Diesel Generator and Auxiliaries System
Components Subject to Aging Management Review

Component Type	Intended Function
Air Dryer (Housing)	Structural Integrity
Bird Screen	Filter
Bolting	Mechanical Closure
Electric Heaters (Housing)	Pressure Boundary
Expansion Joints	Pressure Boundary
Flame Arrestor	Pressure Boundary
Flow Device	Pressure Boundary
	Throttle
Heat Exchanger - (D/G Cooler) Shell Side Components	Pressure Boundary
Heat Exchanger - (D/G Cooler) Tube Sheet	Pressure Boundary
Heat Exchanger - (D/G Cooler) Tubes	Heat Transfer
	Pressure Boundary
Heat Exchanger - (Lube Oil Cooler) Shell Side Components	Pressure Boundary
Heat Exchanger - (Lube Oil Cooler) Tube Sheet	Pressure Boundary
Heat Exchanger - (Lube Oil Cooler) Tube Side Components	Pressure Boundary
Heat Exchanger - (Lube Oil Cooler) Tubes	Heat Transfer
	Pressure Boundary
Hoses	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Integrity
Pump Casing (Fuel Oil Transfer)	Pressure Boundary
Pump Casing (Lube Oil)	Pressure Boundary
Silencer/Muffler	Pressure Boundary
Strainer Element	Filter
Tanks (Air Receivers)	Pressure Boundary
Tanks (Closed Cooling Water Expansion Tanks)	Pressure Boundary
Tanks (Fuel Oil Storage and Day Tanks)	Pressure Boundary
Tanks (Lube Oil Strainer Tank)	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-8 Diesel Generator and Auxiliaries System
Summary of Aging Management Evaluation

2.3.3.9 Drywell Pneumatic System

Description

The Drywell Pneumatic System (DPS) is a normally operating system designed to provide a safety-related supply of gas to pneumatic devices that are essential for safe plant shutdown following a design basis accident. The DPS also is designed to provide a nonsafety-related supply of gas of suitable quality and pressure for operation of pneumatic devices and for purging of the traversing incore probe (TIP) indexing mechanisms located inside the primary containment during normal operation. The DPS is in scope for license renewal. However, portions of the DPS do not perform intended functions and are not in the scope of license renewal.

The purpose of the DPS is to provide a supply of gas for operation of pneumatic devices and for purging of the TIP indexing mechanisms located inside the primary containment. The DPS accomplishes this by drawing gas from inside the primary containment and processing it through filters, compressors, coolers, separators, dryers, and receivers prior to distributing the gas to users inside the primary containment. The DPS includes individual safety-related accumulators of sufficient capacity to provide for the operation of the main steam isolation valves, main steam safety/relief valves, and ADS valves in the event of a loss of the normal nonsafety-related gas supply. The DPS also includes a safety-related backup compressed gas system for the ADS accumulators consisting of two compressed nitrogen bottle banks and an emergency pressurization station which provide a long term pneumatic supply to the ADS valves to support post-accident reactor decay heat removal.

The DPS lines that penetrate the primary containment are provided with safety-related containment isolation valves. All lines penetrating the primary containment, with the exception of the bottled nitrogen to the ADS valve accumulators, are isolated upon a containment isolation signal.

The DPS contains components that are environmentally qualified. The function of providing gas for ADS valve operation is credited for Fire Safe Shutdown and Station Blackout coping.

For more detailed information see UFSAR Section 9.3.1.

Boundary

The DPS license renewal scoping boundary begins at the gas intake inside primary containment and continues through primary containment isolation valves, filters, an inter-cooler, compressor, after-cooler, separator, dryer, and receivers. The boundary continues through primary containment isolation valves to various users in the primary containment including the TIP indexing mechanisms, main steam isolation valve accumulators, main steam safety/relief valve accumulators, ADS valve accumulators, sample valves and pump seal water valves associated with the reactor recirculation system, and testable check valves associated with the reactor core isolation cooling (RCIC) system.

Included in the DPS license renewal scoping boundary is the ADS accumulator backup compressed gas supply. This boundary begins at the bottle banks and gas manifolds and continues through primary containment isolation valves to the ADS accumulators. One bottle bank supplies four of the seven ADS accumulators while the other serves the remaining three ADS accumulators. Each bottle bank includes a reserve bottle which is placed in service during bottle replacement and an emergency pressurization station so that each ADS gas line can be recharged indefinitely via nitrogen bottles brought to that point.

All associated piping, components and instrumentation contained within the boundary described above are also included in the DPS scoping boundary.

Also included in the DPS scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Buildings. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. Also included in the DPS scoping boundary are those gas filled portions of nonsafety-related piping and equipment that extend beyond the safety-related to nonsafety-related interface up to the location of the first seismic anchor. Included in this boundary are components relied upon to preserve the structural support intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the DPS scoping boundary are the TIP indexing mechanisms which are evaluated with the Traversing Incore Probe System.

Not included in the scope of license renewal are non-liquid filled portions of the DPS. This includes portions of the system that have been abandoned in place and verified to not present a spatial interaction with safety-related SSCs.

Reason for Scope Determination

The Drywell Pneumatic System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Drywell Pneumatic System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Drywell Pneumatic System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Drywell Pneumatic System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provide primary containment boundary. The DPS includes safety-related containment isolation valves. 10 CFR 54.4(a)(1)

2. Provide motive power to safety-related components. The DPS provides a supply of gas for operation of the main steam isolation valves, main steam safety/relief valves, and Automatic Depressurization System (ADS) valves following a design basis accident. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The DPS contains nonsafety-related water filled lines in the Reactor

Building which have potential spatial interactions with safety-related SSCs. The DPS also contains nonsafety-related gas filled lines relied upon to preserve the structural support intended function of the system. 10 CFR 54.4(a)(2)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The function of providing gas for ADS valve operation is credited for Fire Safe Shutdown. 10 CFR 54.4(a)(3)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The DPS contains components that are environmentally qualified. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The function of providing gas for ADS valve operation is credited for Station Blackout coping. 10 CFR 54.4(a)(3)

UFSAR References

Table 3.2-1
5.2.2.4.2.1.2
Table 6.2-21
Figure 6.2-31
Table 6.2-28
Table 7.5-1
7.7.6.4
9.3.1

License Renewal Boundary Drawings

LR-LAS-M-66, Sheets 1, 2, 3, 4, 5, 7, 8, 9, 10, 11

Table 2.3.3-9 Drywell Pneumatic System
Components Subject to Aging Management Review

Component Type	Intended Function
Accumulator	Pressure Boundary
Bolting	Mechanical Closure
Compressor Housing	Leakage Boundary
Hoses	Leakage Boundary
	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Integrity
Strainer Element	Filter
Valve Body	Leakage Boundary
	Pressure Boundary
	Structural Integrity

The aging management review results for these components are provided in:

Table 3.3.2-9	Drywell Pneumatic System Summary of Aging Management Evaluation

2.3.3.10 Electrical Penetration Pressurization System

Description

The Electrical Penetration Pressurization (EPP) System is a standby system designed to provide a means to manually supply nitrogen to electrical penetration assemblies for Unit 2. The EPP license renewal system is in scope for license renewal. However, portions of the EPP System are not required to perform intended functions and are not included in the scope of license renewal.

The electrical penetration assemblies provide continuity of electric circuits through the containment building wall, while maintaining containment integrity. The assemblies are pressurized internally with nitrogen, to minimize moisture intrusion and condensation. This ensures that the connected electrical equipment performs as required, and ensures containment leak-tightness. The EPP system consists of piping, valves and pressure instrumentation which connect to these penetrations to monitor the penetration internal pressure; and a permanently connected external pressurization source of nitrogen to allow for manual makeup nitrogen if needed. Portions of the EPP system connect to the penetrations and have been classified as safety-related. However, nitrogen pressurization is not required to maintain the qualification of the penetration.

The EPP system is applicable to Unit 2 only. The Unit 1 electrical penetration design allows for nitrogen supply through local nitrogen bottles, and does not utilize a permanently connected external pressurization source of nitrogen.

For more detailed information, see UFSAR Sections 6.2.6.2, 3.8.1.1, and Table 3.2-1.

Boundary

The EPP System license renewal scoping boundary starts at the branch connection off the low flow nitrogen makeup to the primary containment, and continues to the Unit 2 electrical penetrations. The EPP System includes piping, valves and components which can supply supplemental nitrogen for penetration pressurization if required, and flexible connections between the safety-related and the nonsafety-related components. The EPP System also contains pressure instruments at each electrical penetration to monitor penetration pressure, and a test connection for leak rate testing. The components within the scope of license renewal consist of the safety-related components in the system, specifically the pressure instrument and test connection at each penetration, and the nitrogen supply piping and valves between the electrical penetrations and the flexible connections.

Not included in the EPP System scoping boundary are the electrical penetrations which are part of the primary containment, and are evaluated with the Primary Containment structure for license renewal.

Not included in the scope of license renewal are the nonsafety-related piping and components in the nitrogen supply portion of the system. These components do not perform or support an intended function, and are therefore not included in the scope of license renewal.

Reason for Scope Determination

The Electrical Penetration Pressurization System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Electrical Penetration Pressurization System is not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Electrical Penetration Pressurization System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide primary containment boundary. The EPP System components connect directly to the Unit 2 electrical penetration assemblies and have the potential for structural interaction with them. 10 CFR 54.4(a)(1)

UFSAR References

6.2.6.2
3.8.1.1
Table 3.2-1
Figure 3.8-21

License Renewal Boundary Drawings

LR-LAS-M-148, Sheet 1

Table 2.3.3-10 Electrical Penetration Pressurization System
Components Subject to Aging Management Review

Component Type	Intended Function
Piping, piping components, and piping elements	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-10 Electrical Penetration Pressurization System
Summary of Aging Management Evaluation

2.3.3.11 Essential Cooling Water System

Description

The Essential Cooling Water (ECW) System is a standby system designed to circulate lake water from the ultimate heat sink to the Residual Heat Removal (RHR) System heat exchangers, diesel generator coolers, core standby cooling system area coolers, Low Pressure Core Spray (LPCS) System pump motor cooling coils, and RHR pump seal coolers.

The purpose of the ECW System is to provide cooling water to the RHR heat exchangers, diesel generator coolers, core standby cooling system cubicle area coolers, RHR pump seal coolers, and LPCS pump motor coolers. The ECW System accomplishes this function by circulating cooling water from the ultimate heat sink to the component coolers and returning the heated water to the ultimate heat sink. Strainers are provided upstream of the component coolers to prevent plugging of the cooled component heat transfer passages.

This system also provides a source of emergency makeup water for fuel pool cooling and also provides containment flooding water for post-accident recovery. The ECW System accomplishes these functions by providing water from the ultimate heat sink to the spent fuel pool emergency makeup pumps and requires installation of a pipe spool piece which is normally installed on the emergency makeup pump test line. Flooding of the containment is accomplished by providing water from the ultimate heat sink to the containment through pipe spool sections that are normally disconnected and stored and only installed when needed.

The ECW System is normally not in operation and is placed in service during operation of emergency core cooling systems and the emergency diesel generators. The RHR service water portion of the system is required to operate during all unit shutdowns to remove core residual heat and following a LOCA to provide containment cooling. The diesel generator cooling water portions of the system are required any time the diesel generators are operated or when the LPCS System pumps are operated. The core standby cooling system cubicle area coolers require cooling water only when the core standby cooling system pumps are operating and the normal Reactor Building ventilation systems are not functioning.

The ECW System pumps take suction from the service water tunnel located in the basement of the Lake Screen House. Traveling screens on the inlet to the service water tunnel prevent large pieces of debris from entering the system and blocking flow or damaging equipment. A normally closed bypass around the travelling screens is installed to assure access to a continuous supply of water from the ultimate heat sink in the event that all travelling screens become blocked. A shad net is installed across the Lake Screen House intake flume to deter and prevent Gizzard Shad from intruding into plant components.

Radiation monitors are included downstream of cooled components that contain radioactive fluids to detect potential leakage of radiation to the environment. ECW System discharge lines from these components are capable of remote manual isolation from the control room.

For more detailed information see UFSAR Sections 2.5.5.2.5, 9.2.1, and 9.2.6.

Boundary

The ECW System license renewal scoping boundary begins with the ultimate heat sink portion of the Cooling Lake and continues through the service water tunnel located in the Lake Screen

House, including the 54-inch travelling screen bypass line. The ECW system piping extends from the service water tunnel, through the ECW pumps and pump discharge strainers, to the components requiring cooling and return piping to the Cooling Lake for each reactor unit. The boundary includes the tube sides of the RHR heat exchangers, shell side of the RHR pump seal coolers, tube side of the diesel generator cooling water coolers, the tube side of the core standby cooling system equipment cubicle area coolers, and the connections to the LPCS pump motor housing. The LPCS pump motor is an active assembly and is not subject to aging management review.

The ECW System includes the fuel pool emergency makeup pumps that interface with the containment flooding piping interface with the RHR System and provide capability for make-up to the spent fuel pool through a capped piping connection on the refueling floor.

The ECW System includes the supply and return piping to the Process Radiation Monitoring System panel that contains the RHR service water effluent radiation monitors.

The ECW System includes the shad net and cabling

All associated piping, components and instrumentation contained within the boundary described above are also included in the ECW System scoping boundary.

Also included in the ECW scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Diesel Generator Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the ECW scoping boundary is the ultimate heat sink and the concrete anchors for the shad net which are evaluated with the Cooling Lake license renewal structure.

Not included in the ECW scoping boundary are the radiation monitors which are evaluated with the Process Radiation Monitoring license renewal system.

Not included in the ECW scoping boundary is the service water tunnel which is evaluated with the Lake Screen House license renewal structure.

<u>Reason for Scope Determination</u>

The Essential Cooling Water System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Essential Cooling Water System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Essential Cooling Water System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Essential Cooling Water System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Remove residual heat from the reactor coolant system. The Essential Cooling Water System provides cooling to equipment that removes decay heat from the reactor during normal operation and accident conditions. 10 CFR 54.4(a)(1)

2. Provide heat removal from safety-related heat exchangers. The Essential Cooling Water System removes heat from the RHR heat exchangers and ECCS pump seal and motor coolers during normal operation and accident conditions. 10 CFR 54.4(a)(1)

3. Provide emergency heat removal from primary containment and provide containment pressure control. The Essential Cooling Water System removes heat from the RHR heat exchangers during transient and accident conditions. The Essential Cooling Water System provides containment flooding water for post-accident recovery. 10 CFR 54.4(a)(1)

4. Maintain emergency temperature limits within areas containing safety-related components. The Essential Cooling Water System removes heat from secondary containment equipment compartments that house ECCS and ECW components. 10 CFR 54.4(a)()1)

5. Ensure adequate cooling in the spent fuel pool to maintain stored fuel within acceptable temperature limits. The Essential Cooling Water System provides a source of emergency makeup water for fuel pool cooling. 10 CFR 54.4(a)(1)

6. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Essential Cooling Water System contains nonsafety-related fluid filled lines in the Auxiliary Building which provide structural support or have potential spatial interactions with safety-related SSC. 10 CFR 54.4(a)(2)

7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Essential Cooling Water System provides cooling to equipment that is credited with maintaining reactor level and cooling the reactor and containment for Fire Safe Shutdown. 10 CFR 54.4(a)(3)

8. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Essential Cooling Water System includes components that are environmentally qualified. 10 CFR 54.4(a)(3)

9. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The Essential Cooling Water System provides cooling for equipment that is credited with maintaining reactor water injection and for containment heat removal for Station Blackout coping. 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.6.2
2.5.5.2.5
3.1.2.4.15
3.1.2.4.16
3.1.2.4.17
7.3.3
9.1.3.2.3.6
9.2.1
9.2.6

License Renewal Boundary Drawings

LR-LAS-M-87, Sheets 1, 2, 3
LR-LAS-M-134, Sheets 1, 2, 3
LR-LAS-M-91, Sheet 3
LR-LAS-M-96, Sheet 4
LR-LAS-M-98, Sheet 1
LR-LAS-M-137, Sheet 3
LR-LAS-M-142, Sheet 4
LR-LAS-M-144, Sheet 1
LR-LAS-M-153, Sheets 4, 6
LR-LAS-M-EDGECW, Sheet 1

Table 2.3.3-11 Essential Cooling Water System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Fish Barrier	Filter
Flow Device	Pressure Boundary
	Throttle
Heat Exchanger - (CSCS Equipment Area Cubicle Coolers) Tubes	Heat Transfer
	Pressure Boundary
Heat Exchanger - (D/G Cooler) Tube Sheet	Pressure Boundary
Heat Exchanger - (D/G Cooler) Tube Side Components	Pressure Boundary
Heat Exchanger - (D/G Cooler) Tubes	Heat Transfer
	Pressure Boundary
Heat Exchanger - (LPCS Pump Motor Cooler) Shell Side Components	Pressure Boundary
Heat Exchanger - (LPCS Pump Motor Cooler) Tube Side Components	Pressure Boundary
Heat Exchanger - (LPCS Pump Motor Cooler) Tubes	Heat Transfer
	Pressure Boundary
Heat Exchanger - (RHR Heat Exchanger)	Pressure Boundary

Component Type	Intended Function
Tube Sheet	
Heat Exchanger - (RHR Heat Exchanger) Tube Side Components	Pressure Boundary
Heat Exchanger - (RHR Heat Exchanger) Tubes	Heat Transfer
	Pressure Boundary
Heat Exchanger - (RHR Pump Seal Cooler) Shell Side Components	Pressure Boundary
Heat Exchanger - (RHR Pump Seal Cooler) Tube Side Components	Pressure Boundary
Heat Exchanger - (RHR Pump Seal Cooler) Tubes	Heat Transfer
	Pressure Boundary
Hoses	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (D/G Cooling Water 0DG01P)	Pressure Boundary
Pump Casing (D/G Cooling Water 1DG01P/2DG01P)	Pressure Boundary
Pump Casing (Fuel Pool Emergency Makeup)	Pressure Boundary
Pump Casing (HPCS D/G Cooling Water)	Pressure Boundary
Pump Casing (RHR Service Water)	Pressure Boundary
Strainer Body	Pressure Boundary
Strainer Element	Filter
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-11 Essential Cooling Water System
Summary of Aging Management Evaluation

2.3.3.12 Fire Protection System

Description

The Fire Protection System is a standby system common to both Units 1 and 2 that is designed to provide detection and suppression of a fire at the plant. The Fire Protection System is nonsafety-related, but provides detection and suppression equipment and design features which support safe shutdown of the plant. The Fire Protection System is in scope for license renewal. However, portions of the system are not required to perform intended functions and are not in scope.

The purpose of the Fire Protection System is to prevent fires from starting, quickly detect any fires, quickly suppress fires in hazard areas, prevent the spread of a fire by use of barriers, and provide firefighting capability for manual fire extinguishment.

The Fire Protection System includes water, carbon dioxide, and halon fire suppression systems. It also includes active and passive features such as fire doors, dampers, penetration seals, fire wraps, fire barrier walls and slabs, and flammable fluid retention curbs and walls to prevent the spread of a fire.

The fire water system provides cooling lake water to the plant fire hydrants, the water sprinkler systems, spray systems, deluge systems, and the hose valve stations. The system is normally kept pressurized by two fire protection jockey pumps. If a system demand occurs, the motor driven intermediate fire pump is automatically activated. If the system demand exceeds the capacity of this pump, the pressure decreases in the fire water system, thereby, automatically starting a diesel driven fire pump. If demand is in excess of the capability of a single diesel fire pump or if there is a pump failure, the second diesel driven fire pump is started automatically. If these pumps are unavailable, the plant service water system pumps may be used as a backup to provide the system demand. The fire pumps take suction from the service water tunnel in the Lake Screen House and supply water to the yard ring header. The fire hydrant system is supplied by separate header connections to each of the two diesel driven fire pumps. The yard loop is sectionalized, permitting independence of each unit if desired. Fire protection water is distributed to the hydrants, hose stations, and water suppression systems in the plant from the yard fire main loop, which encircles the power block.

Multiple headers from the outside fire loop are brought into the building complex to feed the standpipes, hose stations and sprinkler, spray and deluge water systems. Wet standpipes for hose stations are located throughout the plant to allow use of fire hoses to support local fire brigade activity. Wet pipe sprinkler operation is initiated automatically when ambient temperature exceeds the melting point of the fusible links of the sealed sprinklers, causing the spray heads to open. Preaction sprinkler system operation is actuated by area fire detectors that open deluge valves supplying fusible element sprinkler heads, which melt when local ambient temperatures rise due to a fire. System actuation transmits alarm signals to the control room.

Deluge sprinkler system operation is initiated by heat detection. Each system is automatically initiated by a high temperature signal from heat detectors. The detection activates a tripping device which opens the deluge valve, thus supplying water under pressure to the open spray nozzles. Deluge valves can also be tripped open manually. System actuation transmits alarm signals to the control room.

Deluge water application systems are also provided for the charcoal filters in the ventilation systems and water is supplied to the filters by a fixed pipe system. Valves are manually opened when a temperature detector actuates a local alarm system and registers an alarm condition in the control room.

An automatic carbon dioxide flooding extended discharge system is provided for each of the five diesel generator rooms. Each system is activated by a fixed temperature rise detector system and may also be manually activated. The carbon dioxide systems consist of a common refrigerated storage unit and associated piping, headers, and valves to the five diesel generator rooms. Hose reels are also provided for manually fighting fires. Audible and visual predischarge alarms warn that the carbon dioxide flooding system is about to actuate so that personnel may leave the area. Actuation of the carbon dioxide flooding system automatically shuts down the local fans and closes the local dampers in the ventilation system. The carbon dioxide storage unit also provides carbon dioxide for fire suppression in the main generator alterex housings and purge gas for the main generators.

Halon fire suppression systems are utilized in the plant computer room in the south service building, QA archives in the north service building, and the records storage building. Audible and visual predischarge alarms warn that the halon system is about to actuate so that personnel may leave the area. Actuation of the halon system automatically shuts down the local fans and closes the local dampers in the ventilation system.

The Fire Protection System includes features to isolate safety-related systems from unacceptable fire hazards. This is accomplished by the use of barriers such as walls, floors, ceilings, fire doors, fire dampers, cable and piping penetration seals and ventilation seals. In addition, curbs and walls are provided to minimize the spread of flammable fluids in the event of a spill.

Fire detection instrumentation, consisting of ionization and heat detectors, is included in the scope of the Fire Protection System.

For more detailed information, see UFSAR Section 9.5.1 and Appendix H, Fire Protection Report.

Boundary

The Fire Protection System license renewal boundary begins in the Lake Screen House where the fire pumps take suction from the service water tunnel and supply water to the fire main ring header and yard fire hydrants, and extends into the building fire distribution piping for hose station standpipes, water spray subsystems, water sprinkler subsystems, and water deluge subsystems throughout the plant. Included is the interface with the Nonessential Cooling Water System that provides a source of fire water in the event the fire water pumps are not available. The diesel engines for the diesel driven fire pumps are a complex active assembly and are, therefore, not subject to aging management review.

The carbon dioxide fire suppression subsystem begins at the carbon dioxide storage unit and extends via distribution piping to each of the five diesel generator rooms and hose reels.

Also included in the system evaluation boundary are the physical plant design features that consist of fire barrier walls and slabs, fire barrier penetration seals, fire doors and dampers, fire wraps, and flammable fluid retention curbs and walls. This includes fire dampers in the

Reactor Buildings, Turbine Buildings, Auxiliary Building, Lake Screen House, Radwaste Building, and Diesel Generator Buildings. The fire damper housings are subject to aging management review. The fire barrier function of all fire damper housings is evaluated with the Fire Protection System for license renewal aging management review. The pressure boundary function of the fire damper housings, if applicable, is evaluated with the appropriate ventilation system. However, the dampers are active components and are not subject to aging management review. The Fire Protection System includes fire rated doors in the Reactor Buildings, Turbine Buildings, Auxiliary Building, and Diesel Generator Buildings. Air supervised preaction sprinkler systems are provided with individual air compressors to maintain air pressure. These compressors are active components and are not subject to aging management review.

The racks, reels, and supports that makeup the fire hose stations are included within the scoping boundary of the Fire Protection System. Hoses are considered consumables, and are therefore, not subject to aging management review.

All associated piping, components, and instrumentation contained within the flowpaths described above are included in the Fire Protection System scoping boundary.

Also included in the Fire Protection System scoping boundary are those water filled portions of nonsafety-related piping and equipment located in areas where there are potential spatial interactions with safety-related equipment. This includes the nonsafety-related portions of the system located within the Reactor Buildings, Turbine Buildings, Auxiliary Building, Lake Screen House, Offgas Building, and Diesel Generator Buildings. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Not included in the Fire Protection System scoping boundary are the drains from fire water system components and areas protected by the fire water system which are evaluated with the Plant Drainage System.

Not included in the Fire Protection System scoping boundary are the fire detection and signaling systems and associated circuitry which are evaluated with Electrical Commodities.

Not included in the Fire Protection System scoping boundary are the Lake Screen House traveling water screens. This equipment is evaluated with the Nonessential Cooling Water System.

Not included in the Fire Protection System scoping boundary is the fuel oil supply piping and diesel fuel fire pump day tank for the fire pump diesel engines which are evaluated with the Diesel Generator and Auxiliaries System.

Not included in the scope of license renewal is the carbon dioxide supply piping to the main generator alterex housings and purge gas for the main generators. This equipment is provided for asset protection and does not perform or support an intended function in accordance with 10 CFR 54.4(a)(3).

Not included in the scope of license renewal is the halon fire suppression system that services the computer room in the south service building and records storage areas in the north service building and records storage building. These areas do not contain any safety-related equipment, and the halon systems do not perform or support an intended function in accordance with 10 CFR 54.4(a)(3).

Not included in the scope of license renewal are fire rated dampers and fire rated doors that do not perform or support an intended function in accordance with 10 CFR 54.4(a)(3).

Reason for Scope Determination

The Fire Protection System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety-related and relied upon to remain functional during and following design basis events. The Fire Protection System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Fire Protection System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Fire Protection System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Fire Protection System includes nonsafety-related SSCs with the potential for spatial and structural interaction with safety-related equipment in the Reactor Buildings, Auxiliary Building, Turbine Buildings, Diesel Generator Buildings, and Offgas Building. 10 CFR 54.4(a)(2)

2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Fire Protection System provides the capability to control postulated fires in plant areas to maintain safe shutdown ability. 10 CFR 54.4(a)(3)

UFSAR References

9.5.1
5.9
Appendix H
3.2-1

License Renewal Boundary Drawings

LR-LAS-M-68, Sheet 1
LR-LAS-M-71, Sheets 1, 2, 3
LR-LAS-M-72, Sheets 1, 2, 5
LR-LAS-M-78, Sheet 1
LR-LAS-M-89, Sheet 1
LR-LAS-M-126, Sheets 1, 2, 3
LR-LAS-M-129, Sheets 3, 4, 7
LR-LAS-M-1442, Sheet 2

LR-LAS-M-1443, Sheet 2
LR-LAS-M-1449, Sheet 1
LR-LAS-M-1451, Sheets 2, 3
LR-LAS-M-1455, Sheet 2
LR-LAS-M-1456, Sheet 2
LR-LAS-M-1459, Sheets 2, 3
LR-LAS-M-1460, Sheet 2
LR-LAS-M-1461, Sheets 1, 2, 3, 4
LR-LAS-M-1462, Sheet 1
LR-LAS-M-1463, Sheet 1
LR-LAS-M-1467, Sheets 1, 3

Table 2.3.3-12 Fire Protection System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Fire Barriers (Damper Housing)	Fire Barrier
Fire Barriers (Doors)	Fire Barrier
Fire Barriers (For Steel Components)	Fire Barrier
Fire Barriers (Penetration Seals and Fire Stops)	Fire Barrier
Fire Barriers (Walls and Slabs)	Fire Barrier
Fire Hydrant	Pressure Boundary
Hose Stations (Racks, Reels, and Supports)	Structural Support
Hoses (Diesel Fire Pump)	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Diesel Fire Pump)	Pressure Boundary
Pump Casing (Fire Intermediate Pump)	Pressure Boundary
Pump Casing (Fire Jockey Pump)	Pressure Boundary
Spray Nozzles	Spray
Sprinkler Heads	Pressure Boundary
	Spray
Strainer Element	Filter
Tanks (Cardox Storage)	Pressure Boundary
Tanks (Retard Chamber)	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-12 Fire Protection System
Summary of Aging Management Evaluation

2.3.3.13 Fuel Pool Cooling and Storage System

Description

The Fuel Pool Cooling and Storage System is a normally operating system designed to provide an environment to safely and temporarily store new and used nuclear fuel and consumable reactor internal components including control rods and nuclear instrumentation. The Fuel Pool Cooling and Storage System includes the spent fuel storage racks, defective fuel storage racks, and control rod blade storage racks within the spent fuel storage pools, and new fuel storage racks. The Fuel Pool Cooling and Storage System also includes skimmer surge tanks, heat exchangers, pumps, water purifying loops, discharge diffusers within the fuel pools, and associated valves, piping components and instrumentation. The Fuel Pool Cooling and Storage System is in scope for license renewal. However, portions of the system are not required to perform intended functions and are not in scope.

The purpose of the Fuel Pool Cooling and Storage System is to maintain the fuel stored in the spent fuel pools and new fuel storage vault in a safe subcritical configuration. The system accomplishes this by removing decay heat from spent fuel assemblies stored in the spent fuel pools, maintaining fuel pool water temperature and level within required limits, purifying water in the spent fuel pools, and minimizing contamination and radiation exposure from fission and corrosion product buildup in the spent fuel pool water. The Fuel Pool Cooling and Storage System also supports filling and draining of the reactor wells and dryer/separator pits in support of refueling operations.

The fuel storage pools, are located in the refueling area within the Reactor Building. Each LaSalle unit has a spent fuel pool and dryer/separator pit. The cask well and new fuel storage vault are common to both units. The spent fuel pools communicate with the reactor wells through fuel transfer canals. Removable gates are inserted in the canal openings to provide a watertight boundary except during refueling when the reactor well is also flooded for underwater transfer of nuclear fuel. The spent fuel pools, cask well, dryer/separator pits, transfer canals, and reactor wells are reinforced concrete structures that are an integral part of the Reactor Building. They are lined with stainless steel plate to minimize leakage. The spent fuel pools contain high-density storage racks equipped with thermal neutron poison material for storage of new and spent fuel. The spent fuel pools also contain storage racks designed to store control rod blades, fuel channels, defective fuel storage containers and other core components that cannot be stored in a fuel storage rack. The spent fuel pools are maintained filled with sufficient level of demineralized water covering the spent fuel storage racks to provide radiation shielding for normal building occupancy by operating personnel. The spent fuel storage racks, defective fuel storage racks, and control rod blade storage racks within the spent fuel storage pools and new fuel storage racks are safety-related and designed to Seismic Category 1 criteria.

Heat is normally removed from the fuel pool cooling heat exchangers by the Nonessential Cooling Water System. Normal make-up to compensate for evaporation and leakage is provided by the Condensate System. A Seismic Category 1 emergency make-up source is provided by the Essential Cooling Water (ECW) System. A Seismic Category 1 emergency cooling capability is provided by the Residual Heat Removal (RHR) System.

The Fuel Pool Cooling and Storage System can be aligned during refueling operations to circulate, cool, and process water from the reactor well and dryer/separator pit. Interconnections are provided to the Suppression Pool Cleanup System to facilitate filling and draining of the reactor well and dryer/separator pit in support of refueling operations.

The Fuel Pool Cooling and Storage System piping and equipment from the skimmer surge tanks to the RHR System and the return piping from the RHR System to the spent fuel pools is safety-related. Piping and equipment in the flowpath through the fuel pool cooling pumps, filter demineralizers, heat exchangers and back to the fuel pool is nonsafety-related. Piping that routes and detects leakage of the fuel pool gates and reactor well drain piping to the primary containment penetrations, is also safety-related up to normally closed valves. All other portions of the Fuel Pool Cooling and Storage System piping are nonsafety-related.

For more detailed information, see UFSAR Sections 7.7.12 and 9.1.

Boundary

The Fuel Pool Cooling and Storage System license renewal scoping boundary begins at the weirs at the surface of the spent fuel pools, reactor wells, and dryer/separator pits, and continues within the Reactor Building through piping to the skimmer surge tanks to the fuel pool cooling water pumps and connection to the RHR System. From the pump discharge the piping leaves the Reactor Building, passes through the Auxiliary Building, enters the Turbine Building, and continues to the filter demineralizers. From the filter demineralizers, the piping returns through the Auxiliary Building to the Reactor Building and continues through the fuel pool heat exchangers to the spent fuel pools, reactor wells and dryer/separator pits. Included are the fuel pool cooling supply connections to the RHR System, the RHR System return piping to the spent fuel pools, supply and return connections to the Suppression Pool Cleanup System, and the connections to the Condensate System.

Also included is the piping installed to drain the cask washdown area and new fuel storage vault, and piping that detects and routes leakage past the fuel pool gates, refueling bellows, and the liners installed in the spent fuel pools, reactor wells, dryer/separator pits, and cask well.

The Fuel Pool Cooling and Storage System scoping boundary also includes the spent fuel storage racks, defective fuel storage racks and control rod blade storage racks within the spent fuel storage pools, and new fuel storage racks.

All associated piping, components, and instrumentation contained within the boundary described above are also included in the Fuel Pool Cooling and Storage System scoping boundary.

Also included in the Fuel Pool Cooling and Storage System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interactions with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located in the Reactor Buildings and Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Not included in the Fuel Pool Cooling and Storage System scoping boundary is the piping and equipment associated with the emergency make-up water source to the spent fuel pools which is evaluated with the ECW System.

Not included in the Fuel Pool Cooling and Storage System scoping boundary are the spent fuel pools, transfer canals, reactor wells, dryer/separator pits and cask well including their liners, new fuel storage vault, and fuel storage pool gates which are evaluated with the Reactor Buildings structure.

Not included in the Fuel Pool Cooling and Storage System scoping boundary are the refueling bellows assemblies which are evaluated with the Primary Containment structure.

Not included in the scope of license renewal is the portion of the Fuel Pool Cooling and Storage System located within the Turbine Building, as this portion of the system is not located in areas where there are potential spatial interactions with safety-related components. Components that are not required to support the system’s leakage boundary intended functions are not included in the scope of license renewal.

Reason for Scope Determination

The Fuel Pool Cooling and Storage System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Fuel Pool Cooling and Storage System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Fuel Pool Cooling and Storage System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Ensure adequate cooling in the spent fuel pool to maintain stored fuel within acceptable temperature limits. The Fuel Pool Cooling and Storage System includes safety-related equipment to circulate and cool the fuel pool water inventory and maintain adequate water inventory. 10 CFR 54.4(a)(1)

2. Prevents criticality of fuel assemblies stored in the spent fuel pool. The spent fuel storage racks maintain new and spent nuclear fuel in a subcritical configuration, with at least 5 percent subcriticality margin. 10 CFR 54.4(a)(1)

3. Provides protection for safe storage of new and spent fuel. The spent fuel storage racks provide physical support, shelter and protection for new and spent nuclear fuel. 10 CFR 54.4(a)(1)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The system includes nonsafety-related piping that has the potential to spatially and structurally interact with safety-related components located in the Reactor and Auxiliary Buildings. 10 CFR 54.4(a)(2)

UFSAR References

Table 3.2.1
7.7.12
9.1

License Renewal Boundary Drawings

LR-LAS-M-98, Sheets 1, 4
LR-LAS-M-144, Sheet 1
LR-LAS-M-91, Sheet 1
LR-LAS-M-96, Sheets 2, 5
LR-LAS-M-103, Sheet 19
LR-LAS-M-137, Sheet 1
LR-LAS-M-142, Sheet 2, 5

Table 2.3.3-13 Fuel Pool Cooling and Storage System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Control Rod Blade Storage Racks	Structural Integrity
Fuel Storage Racks (Defective Fuel)	Structural Integrity
Fuel Storage Racks (New Fuel Storage)	Structural Integrity
Fuel Storage Racks (Unit 1 Spent Fuel)	Absorb Neutrons
	Structural Integrity
Fuel Storage Racks (Unit 2 Spent Fuel)	Absorb Neutrons
	Structural Integrity
Heat Exchanger - (Fuel Pool Cooling) Shell Side Components	Leakage Boundary
Hoses	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Fuel Pool Cooling Pump)	Leakage Boundary
Strainer Element (Inside Skimmer Surge Tank)	Filter
Tanks (Skimmer Surge Tanks)	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-13 Fuel Pool Cooling and Storage System
Summary of Aging Management Evaluation

2.3.3.14 Nonessential Cooling Water System

Description

The Nonessential Cooling Water System is a normally operating system that is designed to provide cooling water to the main condensers and other plant heat exchangers. The Nonessential Cooling Water System consists of the following plant systems: circulating water, service water, screen wash, chemical feed, gland water, and lake make-up and blowdown. The Nonessential Cooling Water System is in scope for license renewal. However, portions of the Nonessential Cooling Water System are not required to perform intended functions and are not included in the scope of license renewal.

Circulating Water

The purpose of the circulating water system is to provide the condensers with a continuous supply of cooling water. The circulating water system accomplishes this by taking water from the man-made Cooling Lake, pumping the water through the condensers and returning the heated water to the Cooling Lake.

Service Water

The purpose of the service water system is to supply cooling water for the turbine-generator and miscellaneous HVAC loads, fuel pool cooling, and the heat exchangers in the turbine building and reactor building closed cooling water systems. Water for the traveling screen wash is also provided by this system. The service water system provides water for filling the fire protection system and serves as a back-up supply for fire water. The service water system also provides water for use in the radwaste system. The circulating water system accomplishes this by taking water from the man-made Cooling Lake, pumping it through various plant equipment and returning water to the Cooling Lake.

Piping in the service water system provides water from the Cooling Lake to the service water tunnel in the Lake Pump House that provides the water to supply the Fire Protection System. The service water system also functions as a credited back-up to the Fire Water System in the event that both diesel fire water pumps are unavailable at the same time.

Screen Wash

The purpose of the screen wash system is to provide water to wash and remove debris from the traveling screens in the Lake Screen House. The screen wash system accomplishes this by providing screened pressurized water to spray onto the traveling screens to dislodge debris from the screen surface for collection and removal.

Chemical Feed

The purpose of the chemical feed system is to minimize the macroscopic biological fouling and microbiologically influenced corrosion in plant systems. The chemical feed system accomplishes this by injection of chemicals into the water supplied from the Cooling Lake to the plant, such as biocides, scale inhibitors, corrosion inhibitors, and silt dispersants.

Gland Water

The purpose of the gland water system is to provide cooling water to plant equipment. The gland water system accomplishes this by providing cooling and sealing water to plant rotating equipment, including the circulating water pumps.

Lake Make-up and Blowdown

The purpose of the lake make-up and blowdown system is to maintain an acceptable water level in the Cooling Lake, control dissolved solids in the Cooling Lake water, and dilute and discharge low-level radioactive wastes. The make-up and blowdown system accomplishes this by pumping water from the Illinois River to maintain level in the Cooling Lake for water lost due to evaporation, seepage, and blowdown. Dissolved solids in the Cooling Lake water are controlled by discharging water from the lake through the blowdown line to the Illinois River. This same blowdown line is used for diluting low-level radioactive liquid waste and then discharging the diluted waste to the Illinois River.

For more detailed information see UFSAR Sections 9.2.2, 9.2.12, and 10.4.5.

Boundary

The Nonessential Cooling Water System license renewal scoping boundary includes that portion of the system that provides water to fill the fire water system and to provide a source of pressurized water to the fire water system if the fire pumps are unavailable. The scoping boundary begins with the traveling water screens and piping in the Lake Screen House that provides water from the Cooling Lake to fill the service water tunnel. The service water pumps as well as the fire water pumps take their suction from the service water tunnel located in the Lake Screen House. The in scope boundary for the service water piping extends from the service water tunnel to the service water pump and discharge piping and continues through strainers to, and including piping and isolation valves in branch lines downstream of the fire water system supply line interface for each unit. The Nonessential Cooling Water System scoping boundary includes the traveling water screens located in the Lake Screen House. The traveling water screens structural framework is subject to aging management review. However, the rotating screen assemblies are active components and are not subject to aging management review.

All associated piping, components, and instrumentation contained within the boundaries described above are also included in the Nonessential Cooling Water System scoping boundary.

Also included in the Nonessential Cooling Water System scoping boundary are those water filled portions of nonsafety-related piping and equipment located in areas where there are potential spatial interactions with safety-related equipment. This includes the nonsafety-related portions of the system located within the Reactor Buildings, Turbine Buildings, and Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the Nonessential Cooling Water System scoping boundary is the service water tunnel which is evaluated with the Lake Screen House.

Not included in the scope of license renewal are the plant screen wash system and lake make-up and blowdown system which do not perform or support an intended function, are not located in areas that contain safety-related systems or components, and therefore are not included in the scope of license renewal.

Reason for Scope Determination

The Nonessential Cooling Water System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety-related and relied upon to remain functional during and following design basis events. The Nonessential Cooling Water System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Nonessential Cooling Water System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Nonessential Cooling Water System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Nonessential Cooling Water System contains nonsafety-related fluid filled lines in the Reactor Buildings, Turbine Buildings, and Auxiliary Building which have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Nonessential Cooling Water System provides a source of fire water and provides a credited backup in the event the diesel fire pumps are unavailable at the same time. 10 CFR 54.4(a)(3)

UFSAR References

1.2.3.1.4
1.2.3.6.3
2.4.8.4
2.5.6.4.5
3.2
9.2.
9.2.2
9.2.12
10.4.5
FPR Section 3

License Renewal Boundary Drawings

LR-LAS-M-68, Sheet 1
LR-LAS-M-69, Sheets 1, 2, 3, 4
LR-LAS-M-125, Sheets 1, 2, 3
LR-LAS-M-63, Sheet 4
LR-LAS-M-70, Sheet 1
LR-LAS-M-77, Sheet 1
LR-LAS-M-87, Sheet 1
LR-LAS-M-89, Sheet 1
LR-LAS-M-91, Sheets 1, 3
LR-LAS-M-115, Sheet 2
LR-LAS-M-134, Sheet 1
LR-LAS-M-137, Sheets 1, 3
LR-LAS-M-153, Sheets 4, 6
LR-LAS-M-159, Sheet 2
LR-LAS-M-1467, Sheet 3

Table 2.3.3-14 <u>Nonessential Cooling Water System</u>
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
	Structural Integrity
Heat Exchanger - (Aux Bldg HVAC Condenser Unit) Tube Side Components	Leakage Boundary
Heat Exchanger - (Aux Bldg HVAC Condenser Unit) Tubes	Leakage Boundary
Heat Exchanger - (Counting Room HVAC Condenser Unit) Tube Side Components	Leakage Boundary
Heat Exchanger - (Counting Room HVAC Condenser Unit) Tubes	Leakage Boundary
Heat Exchanger - (Fuel Pool Cooling) Tube Side Components	Leakage Boundary
Heat Exchanger - (Primary Containment Ventilation Chiller Service Water Condenser) Tube Side Components	Leakage Boundary
Heat Exchanger - (Primary Containment Ventilation Chiller Service Water Condenser) Tubes	Leakage Boundary
Heat Exchanger - (Process Computer Room A/C Unit) Tube Side Components	Leakage Boundary
Heat Exchanger - (Process Computer Room A/C Unit) Tubes	Leakage Boundary
Heat Exchanger - (Reactor Building Closed Cooling Water Heat Exchanger) Tube Side Components	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Service Water)	Pressure Boundary
Tanks (Clean Gland Water)	Leakage Boundary
Traveling Water Screen Framework	Structural Integrity
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-14 Nonessential Cooling Water System
Summary of Aging Management Evaluation

2.3.3.15 Nonsafety-Related Ventilation System

Description

The intended function of the Nonsafety-Related Ventilation (NSV) System for license renewal is to maintain leakage boundary integrity to preclude system interactions. For this reason, this system's pressure-retaining components located in areas where there are potential spatial interactions with components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The NSV System is a normally operating system designed to maintain a favorable environment for plant equipment and personnel while preventing the spread of contamination in the plant. The NSV system consists of various ventilation plant systems and the station heat recovery plant system.

The NSV System provides ventilation to the following plant areas: Auxiliary Building equipment areas, Auxiliary Building office areas, Auxiliary Building laboratory, Lake Screen House, machine shop, Offgas Building, Radwaste Building, Service Building, Service Building storeroom, interim radwaste storage facility, River Screen House, QA records vault, and 345 kV relay house. The NSV system also includes the station heating and recovery plant system, which recycles heat from ventilation exhaust air to preheat ventilation intake air in the winter time, and provides supplemental cooling in the summer time.

For more detailed information, see UFSAR sections 9.4.3, 9.4.6, 9.4.7, 9.4.8, 9.4.11, 9.4.12, 9.4.13, and 9.2.10.

Boundary

The NSV System license renewal scoping boundary encompasses the liquid-filled portions of nonsafety-related piping and equipment located in areas where there are potential spatial interactions with safety-related equipment. This includes the nonsafety-related liquid-filled portions of the system located within the Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this system; specifically the station heat recovery components that are located within the Auxiliary Building. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the NSV System scoping boundary are the ventilation filter bank fire detection instrumentation and associated sprinkler systems. These components perform a fire protection function and are evaluated with the Fire Protection System. Additionally, the fire protection function of fire dampers is evaluated with the Fire Protection System.

Not included in the scope of license renewal is the portion of the NSV System that is nonsafety-related and is not liquid-filled or is not located in areas where there are potential spatial interactions with equipment performing a safety-related function, and therefore does not create a concern for (a)(2) spatial concern. This includes the ventilation portion of the NSV system and the components in the station heat recovery portion of the system that are located in nonsafety-related buildings; for example, the Radwaste Building.

Reason for Scope Determination

The Nonsafety-Related Ventilation System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety-related or relied upon to remain functional during and following design basis events. The Nonsafety-Related Ventilation System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Nonsafety-Related Ventilation System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The NSV system includes nonsafety-related water filled piping and components located in the Auxiliary Building that have the potential for spatial interactions (spray or leakage) with safety-related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

9.4.3
9.4.6
9.4.7
9.4.8
9.4.11
9.4.12
9.4.13
9.2.10

License Renewal Boundary Drawings

LR-LAS-M-102, Sheets 1, 2, 3, 5, 6, 7, 8, 9, 10, 11
LR-LAS-M-129, Sheet 2
LR-LAS-M-151, Sheet 4

Table 2.3.3-15 <u>Nonsafety-Related Ventilation System</u>
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Heat Exchanger - (Primary Containment Vent Chiller Glycol Condenser) Tube Side Components	Leakage Boundary
Heat Exchanger - (Primary Containment Vent Chiller Glycol Condenser) Tubes	Leakage Boundary
Heat Exchanger - (Reactor Bldg, Turb Bldg, Switchgear Rm Supply and Exhaust Coils) Tube Side Components	Leakage Boundary
Heat Exchanger - (Reactor Bldg, Turb Bldg, Switchgear Rm Supply and Exhaust Coils) Tubes	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
Pump Casing (Heat Recovery Transfer Pumps, Fill Pump, Make-up Tank Pump, Heat Coil Drain Pump)	Leakage Boundary
Tanks (Glycol Electric Heaters)	Leakage Boundary
Tanks (Heat Recovery System Expansion Tank)	Leakage Boundary
Tanks (Heat Recovery System Make-up Tank)	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in:

Table 3.3.2-15 Nonsafety-Related Ventilation System
Summary of Aging Management Evaluation

2.3.3.16 Plant Drainage System

Description

The Plant Drainage System is a normally operating system designed to collect various liquid wastes generated in the operation of the plant. The Plant Drainage System consists of several plant systems including floor and equipment drain systems for the Primary Containment, Reactor Building, Auxiliary Building, Diesel Generator Building, Radwaste Building, Offgas Building, Turbine Building, Service Building, and Lake Screen House. The Plant Drainage System also includes the HVAC equipment drain system, generator vent and drain system, roof drain system, wastewater treatment system, and sewage treatment system. The Plant Drainage System is in scope for License Renewal. However, portions of the Plant Drainage System are not required to perform intended functions and are not in scope.

Equipment and Floor Drainage Systems

The purpose of the equipment and floor drainage systems is to collect radioactive, nonradioactive, and oily liquid wastes generated in the operation of the plant. The system accomplishes this by collecting waste liquids from their points of origin and transferring them for eventual processing. Radioactive, nonradioactive, and oily wastes are segregated and processed separately by the appropriate methods.

The drywell floor and equipment drain system includes safety-related and environmentally qualified primary containment isolation valves.

The nonsafety-related drywell drain lines that are routed through the suppression chamber airspace prior to exiting the primary containment are in scope to ensure their pressure boundary integrity to prevent drywell to suppression chamber bypass leakage.

The nonsafety-related floor drain system in the Reactor Building is credited for the mitigation of flooding as a result of a high energy line break (HELB) or a moderate energy line break (MELB) in the Reactor Building and is in scope for the protection of safety-related systems.

Portions of the floor drain systems in the Auxiliary Building, Diesel Generator Building, and Turbine Building are credited for the removal of fire water from areas containing safe shutdown equipment and are in scope for Fire Safe Shutdown. Portions of the floor drain system in the Diesel Generator Building are credited to prevent the accumulation of oil in areas containing safe shutdown equipment and are in scope for Fire Safe Shutdown.

Exposed, non-embedded portions of the equipment and floor drainage systems which have potential spatial interaction with safety-related equipment in the Primary Containment, Reactor Building, Auxiliary Building, Diesel Generator Building, and Offgas Building perform a license renewal intended function and are in scope for potential spatial interaction.

HVAC Equipment Drain System

The purpose of the HVAC equipment drain system is to prevent water accumulation within HVAC ventilation units. The HVAC equipment drain system accomplishes this by collecting condensate from the ventilation unit plenums and draining it for eventual processing. The HVAC equipment drain system is not required to operate to support license renewal intended functions. Only the exposed, non-embedded portions of the HVAC equipment drain system which have potential spatial interaction with safety-related equipment in the Reactor Building, Auxiliary Building, and Turbine Building perform a license renewal intended function and are in scope for potential spatial interaction.

Generator Vent and Drain System

The purpose of the generator vent and drain system is to collect equipment leakoff and drainage from the main turbine and associated components. The generator vent and drain system accomplishes this by collecting leakoff and drainage and transferring them for eventual processing. The generator vent and drain system does not perform a license renewal intended function.

Roof Drain System

The purpose of the roof drain system is to prevent the accumulation of precipitation on plant building roofs. The roof drain system accomplishes this by collecting roof drainage and discharging it into the storm drain system. The roof drain system is not required to operate to support license renewal intended functions. Roof drains are not credited to mitigate the effects of the probable maximum precipitation (PMP). The roofs of safety-related structures are designed for the maximum accumulation of water assuming the roof drains are clogged. Only the exposed, non-embedded portions of the roof drain branch lines and headers which have potential spatial interaction with safety-related equipment in the Reactor Building, Auxiliary Building, and Diesel Generator Building perform a license renewal intended function and are in scope for potential spatial interaction.

Wastewater Treatment System

The purpose of the wastewater treatment system is to process the station's wastewater to comply with state and federal Environmental Protection Agency (EPA) guidelines regulating the effluent returned to the cooling lake. The wastewater system accomplishes this by processing plant waste water through oil separators, equalization tanks, flocculator-clarifier tanks, and media filters prior to releasing through the cooling lake discharge flume. The wastewater treatment system does not perform a license renewal intended function.

Sewage Treatment System

The purpose of the sewage treatment system is to collect and process plant sewage to meet the effluent quality limits set by the Illinois Environmental Protection Agency. The sewage treatment system accomplishes this by collecting sanitary waste through the sanitary waste drain system and transferring the waste to lift stations for processing through primary and secondary aerated lagoon cells. The effluent of the lagoon is treated by sand filtration for total suspended solids reduction then disinfected prior to release. The sewage treatment system is not required to operate to support license renewal intended functions. Only the exposed, non-embedded portions of the sanitary waste drain system which have potential spatial interaction with safety-related equipment in the Auxiliary Building perform a license renewal intended function and are in scope for potential spatial interaction.

For more detailed information see UFSAR Sections 9.3.3.

Boundary

The license renewal scoping boundary of the Plant Drainage System begins at floor and equipment drains and continues through individual drain lines and drain headers which route the collected drainage to plant collection sumps. Included in this scoping boundary are the collection sump pumps and discharge piping up to but not including the radwaste collection tanks. The radwaste collection tanks are evaluated with the Radwaste System. The collection sumps are evaluated with the structure in which they are located.

The floor and equipment drain system for the Primary Containment includes primary containment isolation valves. The safety-related boundary begins at the Primary Containment wall and continues outside of the Primary Containment through piping and two containment isolation valves.

The portion of the drywell drains that are in scope to prevent drywell to suppression chamber bypass leakage include those lines routed through the suppression chamber airspace.

The floor drain system for the Reactor Building is credited for the mitigation of flooding as a result of a high energy line break (HELB) or a moderate energy line break (MELB). The boundary begins at the individual floor drains and continues through individual drain lines and drain headers and terminates at the Reactor Building floor drain collection sump.

The floor drain system for the Auxiliary Building, Diesel Generator Building, and Turbine Building are credited for the removal of fire water from areas containing safe shutdown equipment. Additionally, the floor drain system in the Diesel Generator Building is credited to prevent the accumulation of oil in areas containing safe shutdown equipment. The boundary begins at the individual floor drains and continues through individual drain lines and drain headers and terminates at the Auxiliary Building, Diesel Generator Building, or Turbine Building floor drain collection sumps.

All associated piping, components, and instrumentation contained within the boundary described above are also included in the Plant Drainage System scoping boundary.

Also included in the Plant Drainage System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Primary Containment and Reactor Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. Also included in the Plant Drainage System scoping boundary are those water filled portions of nonsafety-related piping and equipment located in areas where there are potential spatial interactions with safety-related equipment. This includes the nonsafety-related portions of the system located within the Primary Containment, Reactor Building, Auxiliary Building, Diesel Generator Building, Offgas Building, and Turbine Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the Plant Drainage System scoping boundary is the storm sewer system. The storm sewer system is evaluated with Yard Structures.

Not included in the Plant Drainage System scoping boundary is the leak detection components used for the identification of leakage within the Primary Containment and outside of the Primary Containment. These components are evaluated with the Leak Detection System.

Not included in the scope of license renewal are the generator vent and drain system and wastewater treatment system which do not perform or support intended functions. Also not included in the scope of license renewal are the portions of the Plant Drainage System that are nonsafety-related and are not located in areas where there are potential spatial interactions with safety-related equipment.

Reason for Scope Determination

The Plant Drainage System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Plant Drainage System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Plant Drainage System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Environmental Qualification (10 CFR 50.49). The Plant Drainage System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62) and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide primary containment boundary. The Plant Drainage System includes safety-related primary containment isolation valves. 10 CFR 54.4(a)(1)

2. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Plant Drainage System contains nonsafety-related water filled lines in the Reactor Building, Primary Containment, Auxiliary Building, Diesel Generator Building, Offgas Building, and Turbine Building which provide structural support or have potential spatial interactions with safety-related SSCs. The nonsafety-related floor drain system in the Reactor Building is credited for the mitigation of flooding as a result of a high energy line break (HELB) or a moderate energy line break (MELB) in the Reactor Building. Additionally, the nonsafety-related drywell drain lines that are routed through the suppression chamber airspace prior to exiting the primary containment are in scope to ensure their pressure boundary integrity to prevent drywell to suppression chamber bypass leakage. 10 CFR 54.4(a)(2)

3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Plant Drainage System contains components that are environmentally qualified. 10 CFR 54.4(a)(3)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Fire Protection (10 CFR 50.48). The floor drain systems in the Auxiliary Building, Diesel Generator Building, and Turbine Building are credited for the removal of fire water from areas containing safe shutdown equipment. The

floor drain system in the Diesel Generator Building is credited to prevent the accumulation of oil in areas containing safe shutdown equipment. 10 CFR 54.4(a)(3)

UFSAR References

2.4.2.3
Table 3.2-1
3.4.1.4
Table 3.8-1
3.11.1.1
5.2.5.1.1
6.2.4.2.2
Table 6.2-21
Table 6.2-28
7.3.2.2.11
7.6.2.2
7.7.15
9.2.5
9.3.3
9.5
Appendix J.4

License Renewal Boundary Drawings

LR-LAS-M-91, Sheets 1, 2, 3, 4, 5, 6
LR-LAS-M-104, Sheets 1, 2, 3
LR-LAS-M-105, Sheets 1, 2, 3
LR-LAS-M-106, Sheets 4, 8
LR-LAS-M-129, Sheets 1, 2, 3, 4, 7, 8, 9
LR-LAS-M-137, Sheets 1, 2, 3, 4, 5, 6
LR-LAS-M-149, Sheets 1, 2, 3
LR-LAS-M-150, Sheet 2
LR-LAS-M-151, Sheets 3, 4
LR-LAS-M-55, Sheets 1, 2, 7, 8
LR-LAS-M-66, Sheets 1, 3, 5, 9, 10, 11
LR-LAS-M-72, Sheets 1, 2, 5
LR-LAS-M-76, Sheet 4
LR-LAS-M-83, Sheets 1, 2, 3
LR-LAS-M-85, Sheet 1
LR-LAS-M-86, Sheet 1
LR-LAS-M-87, Sheets 1, 2, 3
LR-LAS-M-89, Sheet 1
LR-LAS-M-90, Sheets 1, 2, 3
LR-LAS-M-93, Sheets 1, 2, 4
LR-LAS-M-94, Sheet 1
LR-LAS-M-95, Sheet 1
LR-LAS-M-96, Sheets 1, 2, 3, 4
LR-LAS-M-97, Sheets 1, 2, 3, 4
LR-LAS-M-98, Sheets 1, 4
LR-LAS-M-99, Sheet 1
LR-LAS-M-100, Sheets 1, 3, 4

LR-LAS-M-101, Sheets 1, 2
LR-LAS-M-102, Sheet 11
LR-LAS-M-103, Sheets 15, 16, 19
LR-LAS-M-109, Sheet 1
LR-LAS-M-115, Sheets 2, 12
LR-LAS-M-116, Sheets 2, 7
LR-LAS-M-126 Sheets 1, 2, 3
LR-LAS-M-130, Sheets 1, 2
LR-LAS-M-132, Sheet 1
LR-LAS-M-133, Sheet 1
LR-LAS-M-134, Sheets 1, 2, 3
LR-LAS-M-136, Sheets 1, 2, 3
LR-LAS-M-139, Sheets 1, 2, 4
LR-LAS-M-140, Sheet 1
LR-LAS-M-141, Sheet 1
LR-LAS-M-142, Sheets 1, 2, 3, 4
LR-LAS-M-143, Sheets 1, 2, 3, 4
LR-LAS-M-144, Sheet 1
LR-LAS-M-145, Sheet 1
LR-LAS-M-146, Sheets 1, 3, 4
LR-LAS-M-147, Sheets 1, 2
LR-LAS-M-153, Sheets 4, 6
LR-LAS-M-159, Sheet 2

Table 2.3.3-16 Plant Drainage System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Heat Exchanger - (Drywell Equipment Drain Sump Heat Exchanger) Tube Side Components	Leakage Boundary
Heat Exchanger - (Reactor Building Equipment Drain Tank Heat Exchanger) Tube Side Components	Leakage Boundary
Hoses	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Drywell Floor and Drywell Equipment Drain Pumps)	Leakage Boundary
Pump Casing (Reactor Building Equipment Drain Pump)	Leakage Boundary
Pump Casing (Sump Pumps)	Leakage Boundary
Tanks (Gland Seal Leakoff Reservoir)	Leakage Boundary
Tanks (Reactor Building Equipment Drain Tank)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-16	Plant Drainage System Summary of Aging Management Evaluation

2.3.3.17 Primary Containment Ventilation System

Description

The Primary Containment Ventilation (PCV) System is a normally operating system designed to limit the maximum average temperature of the air to maintain drywell air temperature within equipment operating limits.

The purpose of the PCV System is to maintain a suitable environment inside the drywell for equipment operation and longevity. The PCV system is in scope for license renewal. However, portions of the PCV System are not required to perform intended functions and are not in scope.

The PCV System is composed of two subsystems, the primary containment ventilation plant system and the primary containment chilled water plant system. The two subsystems work together to maintain the reliability of equipment located in the drywell. The ventilation subsystem circulates cooling air within the drywell. The chilled water subsystem removes heat from the drywell air.

A portion of the PCV system performs a safety-related function. The chilled water piping that penetrates Primary Containment and the associated primary containment isolation valves are safety-related components that are relied upon to provide the primary containment boundary. These components are also environmentally qualified.

For more detailed information, see UFSAR Sections 9.2.9 and 9.4.9.

Boundary

The ventilation portion of the PCV system consists of two supply systems, each containing a supply fan which takes suction from the drywell, circulates this air through a drywell cooler train, and discharges the cooled air to two ring headers inside the drywell. The lower ring header supplies cooled air to the lower levels of the drywell. The upper ring header contains six area coolers, and supplies cooled air to the upper levels of the drywell.

The chilled water portion of the PVC system provides cooling water to the drywell cooler trains and the area coolers. The chilled water subsystem is composed of two chilled water loops, consisting of chiller units, chilled water pumps, expansion tanks, a holdup tank, and associated piping, valves and controls. Each chiller unit provides refrigerant for its associated chilled water loop, and consists of an evaporator, condenser, economizer, compressor, and oil cooler.

The portion of the PCV that is in scope for license renewal includes the safety-related portion of the system, the primary containment isolation valves on the chilled water supply and return piping and associated piping and valves.

All associated piping, components, and instrumentation contained within the boundary described above are also included in the PCV System scoping boundary.

Also included in the PCV scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Primary Containment, the Reactor Buildings and the Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system, including all associated piping, components and instrumentation. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Not included in the PCV System scoping boundary are the components associated with the cooling water supply to the chiller condensers which are evaluated with both the Nonessential Cooling Water System and the Nonsafety-Related Ventilation System.

Not included in the PCV System scoping boundary are the interfaces with the reactor building closed cooling water plant system, which can be aligned to provide an alternate source of containment cooling when the reactor is shut down and the normal chilled water subsystem is unavailable. These components are evaluated with the Closed Cycle Cooling Water System.

Not included in the scope of license renewal is the portion of the PCV System that is nonsafety-related and is not liquid-filled or is not located in areas where there are potential spatial interactions with safety-related equipment, and therefore does not create a concern for (a)(2) spatial concern. This includes the ductwork and ventilation components in the drywell that do not contain chilled water.

<u>Reason for Scope Determination</u>

The Primary Containment Ventilation System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Primary Containment Ventilation System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Primary Containment Ventilation System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Primary Containment Ventilation System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

<u>Intended Functions</u>

1. Provide primary containment boundary. The PCV system contains safety-related primary containment isolation valves in the chilled water piping to and from the drywell. 10 CFR 54.4(a)(1)

2. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The PCV system includes nonsafety-related water filled piping and components that have the potential for spatial interactions (spray or leakage) with safety-related SSCs. 10 CFR 54.4(a)(2)

3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Environmental Qualification (10 CFR 50.49). The PCV system contains components associated with the primary containment isolation

valves that are environmentally qualified. 10 CFR 54.4(a)(3)

UFSAR References

9.2.9
9.4.9
Table 3.2-1

License Renewal Boundary Drawings

LR-LAS-M-86, Sheets 1, 3
LR-LAS-M-133, Sheets 1, 3
LR-LAS-M-1453, Sheet 1
LR-LAS-M-1454, Sheet 1
LR-LAS-M-90, Sheet 3
LR-LAS-M-102, Sheet 11
LR-LAS-M-136, Sheet 3
LR-LAS-M-129, Sheets 1, 8, 9

Table 2.3.3-17 Primary Containment Ventilation System Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Ducting and Components	Leakage Boundary
Heat Exchanger - (Primary Containment Vent Chiller Compressor Oil Cooler) Shell Side Components	Leakage Boundary
Heat Exchanger - (Primary Containment Vent Chiller Evaporator) Tube Side Components	Leakage Boundary
Heat Exchanger - (Primary Containment Vent Chiller Evaporator) Tubes	Leakage Boundary
Heat Exchanger - (Primary Containment Ventilation HX and Drywell Area Cooler) Tubes	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Primary Containment Chilled Water Pumps)	Leakage Boundary
Tanks (Chilled Water Holdup and Expansion Tanks, Chilled Water Chemical Feeders)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-17 Primary Containment Ventilation System
Summary of Aging Management Evaluation

2.3.3.18 Process Radiation Monitoring System

Description

The Process Radiation Monitoring System is a normally operating system designed to monitor the level of radioactivity of various process liquid and gas lines that can serve as discharge routes for radioactive materials, provide indication and record of detected levels, and for certain systems, support the prevention of an uncontrolled release of radioactive liquids, gases, and particulates by providing isolation signals to the monitored systems. The Process Radiation Monitoring System consists of safety-related and nonsafety-related portions and is in scope for license renewal. However, portions of the Process Radiation Monitoring System are not required to perform intended functions and are not in scope.

The following process radiation monitors within the Process Radiation Monitoring System are safety-related:

The main steam line radiation monitors are located downstream of the outboard main steam isolation valves, providing indication of radiation levels external to the main steam lines. An abnormal high radiation condition indicates a release of fission products from the fuel and results in a control room alarm.

The Reactor Building ventilation exhaust radiation monitors indicate and record radiation levels from the vent plenum upstream of the duct isolation valves. An abnormal high radiation condition results in automatic isolation of the reactor building ventilation system (part of the license renewal Safety-Related Ventilation System), start of the Standby Gas Treatment System, closure of primary containment purge and vent valves, and a control room alarm.

The fuel floor vent plenum exhaust radiation monitors indicate and record radiation levels from the fuel floor area vent exhaust duct upstream of the duct isolation valves. An abnormal high radiation condition results in automatic isolation of the Reactor Building ventilation system, start of the Standby Gas Treatment System, closure of primary containment purge and vent valves, and a control room alarm.

The control room ventilation intake radiation monitors indicate and record radiation levels from the duct supplying outside air to the main control room. An abnormal high radiation condition results in isolation of the normal outside air supply and a control room alarm. Outside air is then routed through an emergency makeup air filter train to the Control Room Ventilation System,

The standby gas treatment stack effluent monitor draws a sample from the Standby Gas Treatment System stack exhaust whenever the system is operating. Indication of radiation level is provided in the control room. An abnormal high radiation condition results in a control room alarm.

The following process radiation monitors within the Process Radiation Monitoring System are nonsafety-related:

The residual heat removal (RHR) service water (part of the Essential Cooling Water license renewal system) effluent radiation monitors are located on the cooling water piping downstream of each of the two RHR heat exchangers. Indication of radiation level is provided in the control room. An abnormal high radiation condition results in a control room alarm.

The service water (part of the Non-Essential Cooling Water license renewal system) effluent radiation monitor is located at the inlet to the circulating water standpipe prior to discharge to the cooling lake. Indication of radiation level is provided in the control room. An abnormal high radiation condition results in a control room alarm.

The liquid radwaste effluent radiation monitor is located on the radwaste effluent line prior to mixing with lake blowdown flow prior to entering the river. Indication of radiation level is provided in the control room. An abnormal high radiation condition results in automatic isolation of the effluent discharge valve and a control room alarm.

The reactor building closed cooling water (RBCCW) (part of the Closed Cycle Cooling Water license renewal system) radiation monitor is located upstream of the RBCCW heat exchangers to provide indication of leakage into the system from higher pressure contaminated systems. Indication of radiation level is provided in the control room. An abnormal high radiation condition results in a control room alarm.

The off-gas pre-treatment monitor draws an off-gas sample from the downstream side of the recombiner upstream of the charcoal beds. Indication of radiation level is provided in the control room. An abnormal high radiation condition results in a control room alarm.

The off-gas post-treatment monitor draws an off-gas sample from the downstream side of the charcoal beds upstream of the discharge valve. Indication of radiation level is provided in the control room. An abnormal high radiation condition results in automatic closure of the carbon bed filter bypass valve if it is open, opening of the off-gas valve to the carbon bed if it is closed, closure of the off-gas system outlet and drain valves, and a control room alarm.

The off-gas carbon bed vault monitor is located in the carbon vault area. Indication of radiation level is provided in the control room. An abnormal high radiation condition results in a control room alarm.

The station vent stack effluent radiation monitor draws a sample from the station vent stack exhaust. Indication of radiation level is provided in the control room. An abnormal high radiation condition results in a control room alarm.

For more detailed information, see UFSAR Sections 6.4, 7.1.2, 7.3.4, 7.6.1, 7.7.14, 9.4.1, and 11.5.

<u>Boundary</u>

The scoping evaluation boundary for the Process Radiation Monitoring System begins at the sample panel inlet valve on each of the following sample panels: RHR service water effluent monitor loops A and B, RBCCW monitor, service water effluent monitor, and liquid radwaste effluent monitor. The scoping boundary continues through the sample pump, sample chamber, flow control valve, flow indicator, and ends at the sample panel outlet valve, from which the sample is routed back to the process piping. The components within these boundaries are all nonsafety-related, but located within the Reactor Buildings and Auxiliary Buildings. Therefore, they are within the scope of license renewal to support (a)(2) spatial and/or structural support functions.

The scoping boundary for the radiation monitor systems for the main steam lines, control room air intake, reactor building ventilation exhaust, and fuel floor vent plenum exhaust only includes the radiation elements since the radiation elements are external to the process flow path and do not have associated tubing or piping components. These radiation elements are safety-related components that are within the scope of license renewal. The scoping boundary for the off-gas gas carbon bed vault radiation monitor system also only includes the radiation elements since the radiation elements are external to the process flow path and do not have associated tubing or piping components. These radiation elements are nonsafety-related, do not have intended functions, and therefore are not within the scope of license renewal.

The scoping boundary for the off-gas pre-treatment and off-gas post-treatment radiation monitors begins and ends at the piping connections to the associated sample panels and includes all piping components, sample pumps, and instrumentation on the panels. These radiation monitoring systems are nonsafety-related and do not have the potential for spatial interaction with safety- related equipment since they do not contain fluids. Therefore they do not have intended functions and are not within the scope of license renewal.

The scoping boundary for the standby gas treatment stack effluent monitor begins at the piping connections to the standby gas treatment stack and continues to the standby gas treatment vent monitoring panels (0PL58JA and 0PL58JB) and continues via the piping that returns to the stack. The radiation elements on these monitoring panels are abandoned in place, do not have intended functions, and are not in scope for license renewal. The scoping boundary also continues to the standby gas treatment vent sample conditioner panel, continues to the standby gas treatment vent gas monitor panel, and continues via the piping that returns to the stack where the boundary ends. Included are piping components, sample pumps, and instrumentation on the panels. The components within this boundary are safety-related and within the scope of license renewal.

The scoping boundary for the station vent stack effluent monitor begins at the piping connections to the station vent stack and continues to the station vent stack sample conditioner panel, continues to the station vent stack wide range gas monitor panel, and continues via the piping that returns to the stack where the boundary ends. Included are piping components, sample pumps, and instrumentation on the panels. The components within this boundary are nonsafety-related but the alarm function from the station vent stack wide range radiation monitor is credited for prompting operator actions in response to a radioactive gaseous leak abnormal operational transient. Therefore, the station vent stack effluent monitor and associated piping components are within the scope of license renewal.

All associated piping, components, and instrumentation contained within the boundary described above are also included in the Process Radiation Monitoring System scoping boundary.

Also included in the Process Radiation Monitoring System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Buildings and Auxiliary Buildings. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Not included in the Process Radiation Monitoring System scoping boundary are those portions of piping, piping components, and piping elements coming from the various plant systems connected to the radiation monitoring systems. While in scope for license renewal, they are evaluated with the license renewal system from which the fluid originates. These systems include the Closed Cooling Water System, Nonessential Cooling Water System, Radwaste System, Essential Cooling Water System, and Standby Gas Treatment System. The station vent stack is evaluated with the Auxiliary Building Structure.

Reason for Scope Determination

The Process Radiation Monitoring System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Process Radiation Monitoring System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Process Radiation Monitoring System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Process Radiation Monitoring System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The Process Radiation Monitoring System monitors plant processes for radiation level and initiates appropriate protective action to limit the potential release of radioactive materials if predetermined levels are exceeded. The reactor building ventilation exhaust and fuel floor vent plenum exhaust radiation monitors initiate primary and secondary containment isolation and initiate the Standby Gas Treatment System. The control room ventilation intake radiation monitors isolate the normal outside air supply. 10 CFR 54.4(a)(1)

2. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. Some nonsafety-related portions of the system provide structural restraint or support for safety-related components. Some nonsafety-related portions of the system are liquid-filled and have the potential for spatial interaction with safety-related equipment in the Reactor and Auxiliary Buildings. 10 CFR 54.4(a)(2)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The station vent stack wide range radiation monitor is credited to sense process conditions and generate signals to actuate control room alarms to prompt operator actions in response to a radioactive gas waste system leak or failure abnormal operational transient. 10 CFR 54.4(a)(2)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Process Radiation Monitoring System includes safety-related electrical equipment that is environmentally qualified to remain functional during post-accident conditions. 10 CFR 54.4(a)(3)

UFSAR References

6.4
7.1.2
7.3.4
7.6.1
7.7.14
9.4.1
11.5
15.7.1

License Renewal Boundary Drawings

LR-LAS-M-153, Sheets 1, 3, 4, 6, 7

Table 2.3.3-18 Process Radiation Monitoring System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Hoses	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Integrity
Pump Casing (SGTS and SVS Wide Range Sample Pumps)	Pressure Boundary
Pump Casing (RHR Service Water Sample Pumps)	Leakage Boundary
Pump Casing (SGTS Vent Monitor 0PL058 Sample Pumps)	Structural Integrity
Pump Casing (Sample Pumps - Radwaste, Service Water, RBCCW)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary
	Structural Integrity

The aging management review results for these components are provided in:

Table 3.3.2-18 Process Radiation Monitoring System
Summary of Aging Management Evaluation

2.3.3.19 Process Sampling and Post Accident Monitoring System

Description

The Process Sampling and Post Accident Monitoring System is a normally operating system designed to provide indication of critical parameters within containment, to obtain representative samples from process streams and convey them to central sample stations for use in minimizing leakage, spillage, and potential radiation exposure during normal operations, and to collect liquid and gaseous samples of the reactor coolant and containment atmosphere following a post-accident condition. The Process Sampling and Post Accident Monitoring System consists of the containment monitoring system, process sampling system, and post-accident sampling system.

Containment Monitoring System

The purpose of the containment monitoring system is to provide indication and alarms for various containment parameters during normal and abnormal operating conditions. Most of the containment monitoring system is designed to operate during and following a design basis LOCA, and is therefore safety-related. All subsystems, except oxygen monitoring, tritium grab sample station, and continuous air monitoring (CAMS), continue to operate during LOCA conditions and are provided with redundant instrumentation which are powered by separate by ESF Division I and II AC power. It accomplishes this through the use of redundant instrumentation connected to the containment environment. The containment monitoring system measures the following parameters: Drywell (DW) and Suppression Chamber (SC) pressure, DW, SC and Suppression Pool (SP) temperature, SP and containment flooding water levels, DW and SC oxygen and hydrogen concentrations, DW gross radiation and DW and SC airborne radiation levels.

Process Sampling System

The purpose of the process sampling portion of the system is to provide the capability for sampling various process systems during normal plant power operation and shutdown conditions. Plant process sampling stations are located in the Reactor, Turbine, and Radwaste Buildings, and the River Screen House. The process sampling system has no safety-related function. It accomplishes this purpose by taking representative samples from various process lines. The Reactor Building and Turbine Building sample stations are equipped with analyzers that continuously monitor critical parameters. Grab samples may be taken periodically from each station to determine constituents. At each station, samples are adjusted for pressure and temperature as required by the monitoring instruments and for operators' safety. Sample wastes are returned to the condenser, radwaste drains, or equipment drain system as appropriate.

Post-Accident Sampling

The purpose of the post-accident portion of the system is to obtain representative liquid and gas grab samples from the reactor coolant system and within containments for radiological and chemical analysis under accident conditions. The post-accident sampling system has no safety-related function. Failure of the system does not compromise any safety-related system or component, or prevent safe shutdown of the plant. The post-accident portion of the system was originally designed to satisfy certain requirements of NUREG-0737, however elimination of the requirements to have and maintain the post-accident sampling system, has been approved by plant license amendments.

Gaseous and liquid samples are capable of being taken by the post-accident sampling system from the suppression chamber and drywell atmospheres, secondary containment atmosphere, reactor coolant, and drywell equipment and floor drain sumps. Suppression chamber and drywell atmosphere samples are taken utilizing the containment monitoring system. Secondary containment atmosphere samples are taken from the Reactor Building in the vicinity of access doors to determine post-accident accessibility of the Reactor Building. Reactor coolant samples can be taken from the reactor recirculation inlet header and Residual Heat Removal System (RHR) loop sample points. The RHR System sample points provide suppression pool inventory samples when operating in suppression pool cooling, spray, or low pressure coolant injection modes. Fuel pool inventory liquid samples can be obtained when RHR is operating in the fuel pool cooling assist mode. Gaseous samples are returned to the suppression chamber. Liquid samples and leakage collected in the High Radiation Sampling System (HRSS) waste tank are returned either to the waste collection tank or the drywell equipment sump.

For more detailed information, see UFSAR Sections 7.5.2, 9.3.2, and 11.5.5.

<u>Boundary</u>

The scoping evaluation boundary for containment monitoring system begins at various sample points located within containment and are connected to various sampling panels and instruments. The sensing lines have installed excess flow check valves in series with manual isolation valves. Sample lines have series mounted solenoid valves on both sample source and return lines to provide containment isolation when required. Sample stations are enclosed units preventing internal leakage from impacting surrounding in scope equipment. The sample station enclosures are evaluated as a structural commodities as they serve as piping anchor points for (a)(1) in scope piping. Components within the sample station enclosure, not required for license renewal functions, are not in scope for spatial or structural interaction. Portions of the containment monitoring system that are safety-related or are relied upon to support specific (a)(3) functions, are identified on boundary drawings in green. System components that are in scope for spatial interaction or structural support are shown on boundary drawings marked in red.

The scoping boundary for the process sampling system begins at the point where the various process lines connect to sample panel inlet isolation valves. It continues through sample coolers and where installed, specific sampling instrumentation. It ends where the sampled fluid is returned to the condenser, turbine building drains, reactor building equipment or floor drains, radwaste or lake sample pit based on the specific sample station. Components within the sample station enclosures, not required for license renewal functions, are not in scope for spatial interaction or structural support. The process sampling system is not safety-related and is only in scope for spatial interaction or structural support.

The scoping boundary for the post-accident sampling system begins at the point where the various process lines connect to sample panel inlet isolation valves. It continues through sample coolers and where installed, specific sampling instrumentation. Process fluids are piped to the HRSS waste tank where they can be returned to the unit waste collection tank or drywell equipment sumps based on sampling results. The scoping boundary ends where the piping system connects to the Radwaste System (waste collection tank) and the Plant Drainage System (drywell equipment drain sump). Components within the sample station enclosure, not required for license renewal functions, are not in scope for spatial interaction or structural support. The post-accident sampling system is not safety-related and is only in scope for spatial interaction or structural support.

All associated piping, components, and instrumentation contained within the boundary described above are also included in the Process Sampling and Post Accident Monitoring System scoping boundary.

Also included in the Process Sampling and Post Accident Monitoring System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Buildings and Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the Process Sampling and Post Accident Monitoring System scoping boundary are those portions of piping, piping component, and piping elements coming from various plant systems connected to the various sample stations. While within the scope of license renewal, they are evaluated with the license renewal system from which the fluid originates. Systems include Closed Cooling Water System, Condensate System, Nonessential Cooling Water System, Reactor Coolant Pressure Boundary System, Reactor Water Cleanup System, and the Residual Heat Removal System. The sample enclosures and compressed gas bottle storage racks are in scope and are evaluated with the Structural Commodity Group. The heat trace that is installed on containment monitoring piping is evaluated with the Heat Trace System.

Not included in the scope of license renewal for the Process Sampling and Post Accident Monitoring System are piping and components not supporting an intended function, located within the sample enclosures surrounding the sample stations, piping racks, and sample chiller assemblies located in the Reactor Buildings, Auxiliary Building, and Turbine Building structures, as these sample enclosures contain no safety-related equipment. The sample enclosures provide physical shielding, and the enclosed components do not have the potential for spatial interaction with safety-related components. The sample enclosures prevent leakage or spray from impacting safety-related components. Also not included in the scope of license renewal are the Process Sampling and Post Accident Monitoring System components within the River Screen House which do not perform or support intended functions.

Reason for Scope Determination

The Process Sampling and Post Accident Monitoring System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Process Sampling and Post Accident Monitoring System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Process Sampling and Post Accident Monitoring System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63).

The Process Sampling and Post Accident Monitoring System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety feature actuation. The Process Sampling and Post Accident Monitoring System includes containment pressure instrumentation that actuates a reactor trip and an actuation of emergency core cooling system and primary and secondary containment isolation. 10 CFR 54.4(a)(1)

2. Provide primary containment boundary. The Process Sampling and Post Accident Monitoring System includes piping and isolation valves that are part of the primary containment boundary. 10 CFR 54.4(a)(1)

3. Control combustible gas mixtures in the primary containment atmosphere. The Process Sampling and Post Accident Monitoring System includes equipment that samples the containment atmosphere and provides indication of oxygen and hydrogen concentration. 10 CFR 54.4(a)(1)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. Some portions of the nonsafety-related the Process Sampling and Post Accident Monitoring System are relied upon to preserve the structural support intended function of the safety-related piping used for sampling and instrumentation as well as for containment isolation. Some portions of the sampling system may be liquid filled and have the potential for spatial interaction with safety-related equipment found in the Reactor and Auxiliary Buildings. 10 CFR 54.4(a)(2)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). Suppression pool instrumentation for level and temperature supports Fire Safe Shutdown requirements. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). Containment monitoring instrumentation is required to remain functional following a design basis LOCA. 10 CFR 54.4(a)(3)

7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). Suppression pool instrumentation for level and temperature supports Station Blackout under coping requirements. 10 CFR 54.4(a)(3)

UFSAR References

7.5.2
9.3.2
11.5.5

License Renewal Boundary Drawings

LR-LAS-M-92, Sheets 1, 2
LR-LAS-M-93, Sheets 4, 5
LR-LAS-M-115, Sheets 1, 2, 12, 13, 14, 15
LR-LAS-M-138, Sheets 1, 2
LR-LAS-M-139, Sheets 4, 5
LR-LAS-M-156, Sheets 1, 2, 3, 4, 5
LR-LAS-M-158, Sheets 1, 2, 3, 4
LR-LAS-M-159, Sheets 1, 2

Table 2.3.3-19 Process Sampling and Post Accident Monitoring System Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Compressor Housing	Structural Integrity
Flow Device	Pressure Boundary
	Throttle
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Integrity
Pump Casing (H2/O2 Sample Pumps)	Pressure Boundary
Pump Casing (HRSS Room Sump Pump)	Leakage Boundary
Pump Casing (HRSS Sample Pump)	Leakage Boundary
Pump Casing (HRSS Waste Pumps)	Leakage Boundary
Tanks (HRSS Waste Tank)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary
	Structural Integrity

The aging management review results for these components are provided in:

Table 3.3.2-19 Process Sampling and Post Accident Monitoring System Summary of Aging Management Evaluation

2.3.3.20 Radwaste System

Description

The intended function of the Radwaste System for license renewal is to maintain leakage boundary integrity to preclude system interactions. For this reason, this system's pressure-retaining components located in areas where there are potential spatial interactions with safety-related equipment have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope only for potential spatial interaction.

The Radwaste System is a normally operating system designed to collect, monitor, process, and dispose of radioactive wastes. The Radwaste System consists of liquid, solid, and gaseous radwaste plant systems. The Radwaste System is in scope for license renewal. However, portions of the Radwaste System are not required to perform intended functions and are not in scope.

Liquid Radwaste System

The liquid radwaste plant system includes the waste/equipment drain processing subsystem, the floor drain processing subsystem, the chemical waste subsystem, the laundry waste subsystem, and the sludge subsystem. The purpose of the liquid radwaste system is to collect, monitor, and process all potentially radioactive liquid wastes produced by the station.

The waste/equipment drain processing subsystem collects and processes high purity (low conductivity) sources of radioactive liquid waste such as plant equipment drains. This water is treated by settling, filtration, and demineralization and is returned for station reuse through the cycled condensate storage tank (evaluated with the Condensate System).

The floor drain processing subsystem collects and processes low purity (high conductivity) sources of radioactive liquid waste such as plant floor drains. This water is treated using portable vendor supplied waste treatment equipment and is returned for station reuse through the cycled condensate storage tank (evaluated with the Condensate System) or discharged from the station. The floor drain processing subsystem includes mixed bed demineralizers which may be used to assist in processing.

The chemical waste subsystem collects and processes the highest conductivity sources of radioactive liquid waste such as decontamination and laboratory drains, and, spent resin and sludge tank decantate. This water is treated using portable vendor supplied waste treatment equipment and is returned to liquid radwaste system tanks for additional processing. The chemical waste subsystem includes mixed bed demineralizers which may be used to assist in processing.

The laundry waste subsystem collects and processes laundry waste or other soapy, high organic radioactive liquid waste. This water is treated by filtration. This water is discharged from the station or returned to liquid radwaste system tanks for additional processing.

The sludge subsystem provides for intermediate storage of slurries produced as a result of processing radioactive liquid wastes. Sludge subsystem tanks provide settling capability for separation of liquid and solid wastes, holdup for radioactive decay, and storage of slurries prior to transfer to the solid radwaste system.

Solid Radwaste System

The purpose of the solid radwaste plant system is to process all radioactive wet solid wastes produced by the station. The solid radwaste system accomplishes this by receiving, dewatering, solidifying, packaging, handling, and providing temporary storage for radioactive wet solid wastes, such as expended demineralizer resins and spent precoat material, prior to offsite shipment and disposal. The solid radwaste system also receives, decontaminates and/or compacts, and provides temporary storage for all radioactive dry wastes produced by the station prior to offsite shipment and disposal.

Gaseous Radwaste System

The purpose of the gaseous radwaste plant system is to process and control the release of gaseous radioactive wastes to the site environment. The gaseous radwaste system accomplishes this through the use of high-temperature catalytic recombining, holdup for decay, high-efficiency particulate filtration, and charcoal adsorption prior to discharging to the station vent stack (evaluated with the Auxiliary Building structure).

For more detailed information see UFSAR Sections 11.2, 11.3, and 11.4.

Boundary

The Radwaste System scoping boundary encompasses the liquid-filled portions of nonsafety-related piping and equipment located in areas where there are potential spatial interactions with safety-related equipment. This includes the liquid-filled portions of the system located within the Reactor Building and Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the Radwaste System scoping boundary are the plant drains, collection sumps, sump pumps, and sump pump discharge piping to the Radwaste System collection tanks. Plant drains, sump pumps, and sump pump discharge piping are evaluated with the Plant Drainage System. Collection sumps are evaluated with the structure where they are located.

Not included in the Radwaste System scoping boundary is the standby gas treatment system wide range gas monitoring sample pump. The standby gas treatment system wide range gas monitoring sample pump is evaluated with the Process Radiation Monitoring system.

Reason for Scope Determination

The Radwaste System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety-related or relied upon to remain functional during and following design basis events. The Radwaste System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Radwaste System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Radwaste System contains nonsafety-related fluid filled lines in the Reactor Building and Auxiliary Building which have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

1.2.3.4
2.4.12
3.1.2.6.2.3
Table 3.2-1
7.7.10
7.7.11
11.2
11.3
11.4
11.5.2.3.3

License Renewal Boundary Drawings

LR-LAS-M-97, Sheet 1
LR-LAS-M-103, Sheets 15, 16, 27
LR-LAS-M-113, Sheet 1
LR-LAS-M-143, Sheet 1
LR-LAS-M-153, Sheet 4

Table 2.3.3-20 Radwaste System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Leakage Boundary
Pump Casing (Cleanup Phase Separator Sludge Pump)	Leakage Boundary
Tanks (RWCU Cleanup Phase Separators)	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in:

Table 3.3.2-20 Radwaste System
Summary of Aging Management Evaluation

2.3.3.21 Reactor Water Cleanup System

Description

The Reactor Water Cleanup (RWCU) System is designed to maintain high purity reactor water. The RWCU system may be operated at any time during reactor operations (normal, startup, shutdown, hot standby, and refueling) or may be shutdown when not required to clean up reactor coolant.

The purpose of the RWCU System is to: remove solid and dissolved impurities from recirculated reactor coolant; discharge excess reactor water during startup, shutdown, and hot standby conditions; minimize temperature gradients in the recirculation piping and vessel during periods of low flow rates; and conserve reactor heat. The RWCU System accomplishes these purposes by forced circulation of reactor coolant through regenerative and non-regenerative heat exchangers and filter-demineralizers.

The RWCU System also provides for monitoring the durability and effectiveness of noble metal compounds deposited on reactor vessel and piping surfaces. The RWCU System accomplishes this by processing reactor coolant through a material monitoring system and a data acquisition system.

The RWCU System includes a safety-related and environmentally qualified remote manual-operated primary containment isolation valve on the return line to the reactor which provides for long-term leakage control in the event of a piping failure in the RWCU System. A nonsafety-related and non-environmentally qualified check valve is provided for instantaneous reverse flow isolation.

The RWCU System is a high energy system and includes safety-related flow elements and instrumentation for the determination of RWCU System high differential flow. The high differential flow signal is an indication of leakage or a break in RWCU piping and is used to automatically isolate the RWCU system from the reactor coolant pressure boundary.

The RWCU blowdown flow control valve, RWCU discharge to main condenser valve, and RWCU drain to waste surge tanks valve are credited as high-low pressure interfaces for Fire Safe Shutdown.

For more detailed information see UFSAR Section 5.4.8.

Boundary

The RWCU System license renewal scoping boundary begins downstream of the RWCU System suction outboard containment isolation valve. The boundary continues through the two RWCU recirculation pumps, the common pump discharge header, the tube sides of the two regenerative heat exchangers, the tube sides of the two non-regenerative heat exchangers (the shell sides are evaluated with the Closed Cycle Cooling Water System), and the three cleanup filter demineralizers, including associated backwash and precoat equipment. The boundary then continues through the shell sides of the two regenerative heat exchangers, the RWCU return containment isolation valve, and then ends at the attachments to the Feedwater System. The RWCU System license renewal scoping boundary includes blowdown lines to the main condenser (evaluated with the Condenser and Air Removal System) and waste surge tanks (evaluated with the Radwaste System).

Included in the RWCU System license renewal scoping boundary are the material monitoring system and a data acquisition system which monitor the durability and effectiveness of noble metal compounds deposited on reactor vessel internals and reactor coolant pressure boundary piping surfaces. The material monitoring system samples reactor coolant from the common discharge header of the RWCU pumps and returns reactor coolant to the common header upstream of the RWCU pumps.

All associated piping, components and instrumentation contained within the boundary described above are also included in the RWCU System scoping boundary.

Also included in the RWCU System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building and Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the RWCU System scoping boundary are the reactor coolant pressure boundary and containment isolation piping and components associated with the suction portion of the system which are evaluated with the Reactor Coolant Pressure Boundary System.

<u>Reason for Scope Determination</u>

The Reactor Water Cleanup System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Reactor Water Cleanup System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Reactor Water Cleanup System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Environmental Qualification (10 CFR 50.49). The Reactor Water Cleanup System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62) and Station Blackout (10 CFR 50.63).

<u>Intended Functions</u>

1. Provide reactor coolant pressure boundary. The RWCU System includes a safety-related remote manual-operated valve on the return line to the reactor to provide long-term leakage control in the event of a piping failure in the RWCU System. 10 CFR 54.4(a)(1)

2. Provide primary containment boundary. The RWCU System includes a safety-related remote manual-operated primary containment isolation valve on the return line to the reactor. 10 CFR 54.4(a)(1)

3. Sense process conditions and generate signals for reactor trip or engineered safety

features actuation. The RWCU System includes safety-related flow elements and instrumentation for the determination of RWCU System high differential flow. The high differential flow signal is an indication of leakage or a break in RWCU piping and is used to automatically isolate the RWCU System from the reactor coolant pressure boundary. 10 CFR 54.4(a)(1)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The RWCU System contains nonsafety-related high energy and moderate energy lines in the Reactor Building and Auxiliary Building which provide structural support or have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The RWCU blowdown flow control valve, RWCU discharge to main condenser valve, and RWCU drain to waste surge tanks valve are credited as high-low pressure interfaces for Fire Safe Shutdown. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The RWCU System includes an environmentally qualified remote manual-operated valve on the return line to the reactor. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

1.2.2.3.5
1.2.2.6.6
Table 3.2-1
5.2.5
Table 5.2-8
5.4.8
6.2.4.2.1
Table 6.2-21
Table 6.2-28
7.3.2.2.3.8
7.6.2.2.6
7.7.8
Appendix C

<u>License Renewal Boundary Drawings</u>

LR-LAS-M-97, Sheets 1, 2, 3, 4, 5
LR-LAS-M-143, Sheets 1, 2, 3, 4, 5
LR-LAS-M-57, Sheet 1
LR-LAS-M-91, Sheets 1, 2
LR-LAS-M-100, Sheet 1
LR-LAS-M-103, Sheets 15, 16, 19
LR-LAS-M-115, Sheets 1, 12
LR-LAS-M-118, Sheet 1
LR-LAS-M-137, Sheets 1, 2
LR-LAS-M-146, Sheet 1
LR-LAS-M-159, Sheet 1

Table 2.3.3-21 Reactor Water Cleanup System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Heat Exchanger - (Clean-Up Regenerative Heat Exchangers) Shell Side Components	Leakage Boundary
Heat Exchanger - (Clean-Up Regenerative Heat Exchangers) Tube Side Components	Leakage Boundary
Heat Exchanger - (Clean-up Non-Regenerative Heat Exchanger) Tube Side Components	Leakage Boundary
Heat Exchanger - (RWCU Pump Heat Exchanger) Shell Side Components	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Clean-Up Filter Demineralizer Holding Pump)	Leakage Boundary
Pump Casing (Clean-Up Filter Demineralizer Precoat Pump)	Leakage Boundary
Pump Casing (Reactor Water Clean-Up Recirculation Pump)	Leakage Boundary
Tanks (Clean-Up Filter Demineralizer Precoat Tank)	Leakage Boundary
Tanks (Clean-Up Filter Demineralizer)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-21 Reactor Water Cleanup System
Summary of Aging Management Evaluation

2.3.3.22 Safety-Related Ventilation System

Description

The Safety-Related Ventilation (SRV) System is a normally operating system designed to provide a favorable environment for plant equipment and personnel while preventing the spread of contamination in the plant. The SRV System also includes dampers and ductwork that are part of the secondary containment boundary. The SRV System is in scope for license renewal. However, portions of the SRV System are not required to perform intended functions and are not in scope. The SRV license renewal system consists of the following plant systems: Reactor Building ventilation system, ECCS equipment cooling ventilation system, diesel generator room ventilation system, switchgear heat removal system, and Turbine Building ventilation system.

Reactor Building Ventilation

The Reactor Building ventilation plant system provides filtered outdoor air to control the Reactor Building temperature in generally accessible areas, and to maintain a minimum negative pressure of 0.25 inches of water with respect to atmospheric pressure. The system performs the safety-related functions to close isolation dampers when secondary containment isolation is required, isolate the main steam tunnel in the event of a pipe break in the tunnel, and isolate the fuel pool area exhaust ducts during a fuel drop accident. Additionally, the exhaust duct pressure relief dampers and excess flow check dampers ensure the integrity of the Seismic Category I exhaust plenum walls.

ECCS Equipment Cooling Ventilation

The ECCS equipment cooling ventilation plant system performs the safety-related function to provide cooling to the ECCS equipment cubicles whenever the ECCS equipment is required for service. The system removes equipment heat from the ECCS equipment areas and maintains temperatures within equipment limits.

Diesel Generator Room Ventilation

The diesel generator room ventilation plant system provides safety-related ventilation to the diesel generator rooms, the diesel generator storage tank rooms, the diesel generator day tank rooms, the high pressure core spray (HPCS) diesel generator cooling water pump rooms, and the HPCS switchgear rooms and battery rooms. The system maintains area temperatures within equipment requirements, and provides ventilation to the diesel generators.

Switchgear Heat Removal

The switchgear heat removal plant system provides safety-related ventilation to the reactor protection system MG Set room, the essential switchgear areas, and battery rooms. The system removes equipment heat to maintain area temperatures within equipment requirements.

Turbine Building Ventilation

The Turbine Building ventilation plant system provides ventilation to operating areas in the Turbine Building to maintain area temperatures within equipment requirements. The steam tunnel check dampers in this system perform a safety-related function to close during high energy line break conditions to form a pressure boundary between the main steam tunnel and the HPCS switchgear room. The Turbine Building ventilation exhaust through the station vent stack provides a pathway for the potential release of fission products following certain abnormal operating conditions.

For more detailed information, see UFSAR Sections 6.2.3, 7.3.7, 9.4.2, 9.4.4, 9.4.5, and 15.7.1.

Boundary

The SRV System license renewal scoping boundary includes the following plant systems as discussed in the System Description: Reactor Building ventilation system, ECCS equipment cooling ventilation system, diesel generator room ventilation system, switchgear heat removal system, and Turbine Building ventilation system. The scoping boundary begins where outside air provides fresh air to supply fans and ends where exhaust air either exits the structure or enters the ventilation stack for each plant system. The scoping boundary includes inlet filters, supply and exhaust fans, associated dampers, ductwork, instrumentation, and controls.

The portion of the SRV System which is in scope for license renewal includes secondary containment isolation dampers and associated ductwork; the spent fuel pool exhaust ducts from elevation 843'6" to elevation 736'6" inside the Reactor Building; and the steam tunnel isolation dampers. The SRV System also includes the ECCS equipment cooling ventilation equipment including the cubicle cooling fans and coils and associated ductwork. Also included are the diesel generator room ventilation and switchgear heat removal plant systems, which include supply and exhaust fans, filters and associated dampers and ductwork, and the Turbine Building ventilation exhaust to the plant vent stack and associated components and ductwork. The SRV boundary also includes the associated instrumentation and controls for the above equipment.

All associated piping, components, and instrumentation contained within the boundary described above are also included in the SRV System scoping boundary.

Also included in the SRV System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Buildings. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function, specifically the CSCS equipment area cubicle cooler drain pans. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the SRV System scoping boundary are the components associated with the cooling water supply to the ECCS equipment cubicle coolers which are evaluated with the Essential Cooling Water System. Additionally, the fire protection function of fire dampers is evaluated with the Fire Protection System. The ventilation stack that receives exhaust air from the Reactor Building ventilation system is evaluated with the Auxiliary Building Structure. The SRV system interfaces with the heat recovery plant system, which heats the air entering the building. The heat recovery subsystem components are evaluated with the Nonsafety-Related Ventilation System.

Not included in the scope of license renewal are the nonsafety-related portions of the Reactor Building and Turbine Building ventilation systems since they do not perform or support system intended functions.

Reason for Scope Determination

The Safety-Related Ventilation System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Safety-Related Ventilation System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Safety-Related Ventilation System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Safety-Related Ventilation System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Maintain emergency temperature limits within areas containing safety-related components. The SRV System maintains environmental conditions to ensure that the operability of safety-related equipment in the ECCS equipment rooms, the diesel generator rooms, and the essential switchgear rooms is maintained. 10 CFR 54.4(a)(1)

2. Provide secondary containment boundary. The SRV System contains isolation dampers which close when secondary containment isolation is required. 10 CFR 54.4(a)(1)

3. Provide a pathway to the station vent stack for the potential release of fission products following certain abnormal operating conditions. 10 CFR 54.4(a)(2)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The SRV System includes water filled components that have the potential for spatial interactions (spray or leakage) with safety-related SSCs. 10 CFR 54.4(a)(2)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Fire Protection (10 CFR 50.48). The ECCS equipment cooling ventilation, diesel generator room ventilation, and switchgear heat removal plant portions of the SRV license renewal system are relied upon to operate during a Fire Safe Shutdown event. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Environmental Qualification (10 CFR 50.49). The ECCS equipment cooling ventilation and the Reactor Building ventilation portions of the SRV System contain components that are environmentally qualified. 10 CFR 54.4(a)(3)

7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Station Blackout (10 CFR 50.63). The SRV System is relied upon to provide equipment cooling for the diesel generators and other safety-

related equipment during SBO coping and recovery. 10 CFR 54.4(a)(3)

UFSAR References

6.2.3
7.3.7
9.4.2
9.4.4
9.4.5
15.7.1

License Renewal Boundary Drawings

LR-LAS-M-92, Sheet 1
LR-LAS-M-104, Sheet 1
LR-LAS-M-129, Sheet 1
LR-LAS-M-138, Sheet 1
LR-LAS-M-149, Sheet 1
LR-LAS-M-1444, Sheet 1
LR-LAS-M-1445, Sheet 1
LR-LAS-M-1446, Sheet 1
LR-LAS-M-1447, Sheet 1
LR-LAS-M-1455, Sheets 1, 2, 3
LR-LAS-M-1459, Sheets 1, 2
LR-LAS-M-1460, Sheets 1, 2
LR-LAS-M-1456, Sheets 1, 2, 3
LR-LAS-M-1462, Sheets 1, 2
LR-LAS-M-1463, Sheet 1
LR-LAS-M-1464, Sheet 1
LR-LAS-M-1465, Sheet 1

Table 2.3.3-22 <u>Safety-Related Ventilation System</u>
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Ducting and Components	Leakage Boundary
	Pressure Boundary
Flexible Connection	Pressure Boundary
Heat Exchanger - (CSCS Equipment Area Cubicle Coolers) Fins	Heat Transfer
Heat Exchanger - (CSCS Equipment Area Cubicle Coolers) Shell Side Components	Pressure Boundary
Heat Exchanger - (CSCS Equipment Area Cubicle Coolers) Tubes	Heat Transfer
	Pressure Boundary
Piping, piping components, and piping elements	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-22 Safety-Related Ventilation System
Summary of Aging Management Evaluation

2.3.3.23 Standby Liquid Control System

Description

The Standby Liquid Control (SLC) System is a standby system that is manually operated to shutdown the reactor if the normal reactivity control provisions become inoperative. The system is designed to bring the reactor to a shutdown condition at any time in core life independent of control rod insertion capability. The most severe requirement for which the system is designed is shutdown from a full power operating condition assuming complete failure of the Control Rod Drive (CRD) System to respond to a scram signal. The SLC System is in scope for license renewal. However, portions of the SLC System are not required to perform intended functions and are not in scope.

The primary purpose of the SLC System is to shutdown the reactor independent of the CRD System. The SLC System accomplishes this purpose by injecting sodium pentaborate solution directly into the reactor vessel to absorb thermal neutrons. The SLC System operation is also credited during a Loss of Coolant Accident to maintain suppression pool water pH at acceptable levels to minimize the radiological release to the environment.

The SLC System is capable of satisfying the requirements of the system generic design basis as well as the requirement for the reduction of risks from an Anticipated Transient Without Scram (ATWS) as specified in 10 CFR 50.62 (ATWS Rule).

For more detailed information see UFSAR Section 9.3.5.

Boundary

The SLC System license renewal scoping boundary begins at the SLC solution tank and continues through two positive displacement pumps, pulsation dampeners, pump discharge relief valves, and up to two parallel explosive actuated valves that open upon SLC System manual initiation. Also included in the system boundary are the electric heaters and air sparger within the SLC solution tank, heat tracing on piping that normally contains sodium pentaborate solution, and the SLC test tank.

All associated piping, components and instrumentation contained within the boundary described above are included in the SLC System boundary.

Also included in the SLC System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Buildings. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of the system. For more information, refer to the License Renewal Boundary Drawing for identification of the boundary, shown in red.

Not included in the SLC System scoping boundary are the piping and components from the two parallel explosive actuated injection valves to the nozzle on the reactor pressure vessel which are evaluated with the Reactor Coolant Pressure Boundary System. The SLC injection line within the reactor vessel is evaluated with the Reactor Vessel Internals. The heat trace that is installed on the SLC System piping that normally contains SLC solution while the system is in standby mode is evaluated with the Heat Trace System.

Reason for Scope Determination

The Standby Liquid Control System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Standby Liquid Control System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Standby Liquid Control System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62). The Standby Liquid Control System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Introduce emergency negative reactivity to make the reactor subcritical. The SLC System provides backup capability for reactivity control, independent of normal reactivity control provisions in the nuclear reactor, to be able to shutdown the reactor if the normal control ever becomes inoperative. 10 CFR 54.4(a)(1)

2. Control and treat radioactive materials released to the secondary containment. In the event of a Loss of Coolant Accident, the SLC System is manually initiated from the control room to pump sodium pentaborate into the reactor to maintain suppression pool pH at a level of 7.0 or higher to minimize iodine releases from primary containment to the environment. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The SLC System includes nonsafety-related fluid filled lines in the Reactor Building which have the potential for spatial and structural interaction with safety-related SSCs. 10 CFR 54.4(a)(2)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transients Without Scram (10 CFR 50.62). The SLC System injects sodium pentaborate solution into the reactor to achieve shutdown for mitigation of an Anticipated Transient Without Scram. 10 CFR 54.4(a)(3)

UFSAR References

9.3.5
7.4.2
Table 3.2-1
Table 6.2-28
15.8

License Renewal Boundary Drawings

LR-LAS-M-99, Sheet 1
LR-LAS-M-145, Sheet 1

Table 2.3.3-23 **Standby Liquid Control System**
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Integrity
Pump Casing (SLC Pump)	Pressure Boundary
Tanks (SLC Solution Tank)	Pressure Boundary
Tanks (SLC Test Tank)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary
	Structural Integrity

The aging management review results for these components are provided in:

Table 3.3.2-23 Standby Liquid Control System
Summary of Aging Management Evaluation

2.3.3.24 Suppression Pool Cleanup System

Description

The intended function of the Suppression Pool Cleanup (SPC) System for license renewal is to maintain leakage boundary integrity to preclude system interactions. For this reason, this system's pressure-retaining components located in areas where there are potential spatial interactions with safety-related equipment have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope only for potential spatial interaction.

The SPC System is a normally operating system designed to provide a means of improving the quality of the water in the suppression pool and transferring suppression pool water to the reactor well and the dryer-separator well in support of refueling operations. The SPC System can also be used to transfer suppression pool water to the main condenser. The SPC System does not have any safety-related functions. The SPC System is in scope for license renewal. However, portions of the SPC System are not required to perform intended functions and are not in scope.

The SPC System includes two pumps for each unit that can be aligned to circulate water from the suppression pool via Residual Heat Removal (RHR) System piping, through the condensate prefilters and polishers, and back to the suppression pool to improve suppression pool water chemistry parameters. The SPC pumps can also be aligned to discharge suppression pool water to the main condenser via Feedwater System piping or to the reactor well or the dryer/separator pit via Fuel Pool Cooling and Storage System piping. The SPC System can also be aligned to provide a flowpath from the fuel pool cooling demineralizers to the suppression pool to drain the reactor well or the dryer/separator pit. All SPC System piping interconnections with the RHR System, Feedwater System, Fuel Pool Cooling and Storage System and Condensate System are via removable piping spool pieces that are physically removed with blank flanges installed during plant operation.

For more detailed information see UFSAR Section 9.2.11.

Boundary

The SPC System scoping boundary encompasses the liquid-filled portions of the nonsafety-related piping and equipment located in areas where there are potential spatial interactions with safety-related equipment. This includes the liquid-filled portions of the system located within the Reactor Buildings, Turbine Buildings, and Auxiliary Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Reason for Scope Determination

The Suppression Pool Cleanup System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety-related or relied upon to remain functional during and following design basis events. The Suppression Pool Cleanup System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Suppression Pool Cleanup System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The SPC System contains nonsafety-related fluid filled lines in the Reactor Buildings, Turbine Buildings, and Auxiliary Building which have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

9.2.11

License Renewal Boundary Drawings

LR-LAS-M-91, Sheets 1, 5
LR-LAS-M-96, Sheets 3, 5
LR-LAS-M-137, Sheets 1, 5
LR-LAS-M-142, Sheets 3, 5

Table 2.3.3-24 Suppression Pool Cleanup System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Leakage Boundary
Pump Casing (Suppression Pool Cleanup Pump)	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in:

Table 3.3.2-24 Suppression Pool Cleanup System
Summary of Aging Management Evaluation

2.3.3.25 Traversing Incore Probe System

Description

The Traversing Incore Probe (TIP) System is a standby system designed to calibrate the Local Power Range Monitor (LPRM) Neutron Monitoring System detectors and update parameters that incorporate LPRM and TIP data into local power distribution calculations. The TIP System includes mechanical components that provide primary containment boundaries and support insertion and withdrawal of neutron flux detectors into the reactor core.

The purpose of the TIP System is to measure local neutron flux at various locations throughout the core in support of calibrating the LPRMs. The TIP System accomplishes its purpose by utilizing five neutron monitoring detectors and positioning systems capable of moving the flux detectors to various locations in the core corresponding to the locations of the LPRM detectors. The moveable TIP detectors generate signals that are processed to indicate local power in the vicinity of each LPRM detector. The TIP System is in scope for license renewal. However, portions of the TIP System are not required to perform intended functions and are not in scope.

The five TIP detectors are normally fully withdrawn from the core and stored outside of primary containment within a radiation shield chamber. Each detector has a drive mechanism that includes a motor and drive reel assembly. The detectors are attached to a drive and signal cable that that inserts and retracts the detector from the reactor core, driven by the drive mechanism. Digital position indicators provide continuous indication of detector position and core top and core bottom position for the selected location. TIP guide tubing provides a guide for the TIP detector throughout its travel from the shield chamber to the core top position inside the reactor vessel. An indexing mechanism associated with each detector allows the selection of the core locations, including a core location common to all five detectors used for cross-calibrating the detectors. The TIP flux probe monitor consists of a dual channel amplifier and a power supply. The amplifier conditions the detector signal to provide an input to the plant computer for determining local power. The power supply provides operating power to the flux amplifier and to the detector. A drive control unit in the main control room provides control of detector insertion and retraction and displays TIP detector location, drive speed, travel limits, indexer alignment status, and ball valve position.

Each of the five drive mechanism trains includes an explosive-actuated shear valve and a ball valve located outside primary containment that perform a primary containment isolation function. The ball valve is normally closed except when the detector is inserted. The ball valve can be manually controlled, but is normally opened and closed automatically, with interlocks to open the valve when the detector leaves the shield, and to de-energize the drive mechanism should the ball valve not open after the insert operation is selected for the TIP detector. Upon receipt of a primary containment isolation signal, an inserted TIP detector is fully retracted and the ball valve automatically closes when the detector reaches the shield chamber. The explosive-actuated shear valve is used only to isolate the guide tube while a detector is inserted past the ball valve and power is lost to the drive mechanism or some other fault has occurred which prevents retraction of the TIP detector and closure of the ball valve. A key-lock switch manually activates the explosive-actuated shear valve. When actuated, a guillotine cuts the TIP guide tube and detector cable inside it, sealing the guide tube.

The Drywell Pneumatic System provides a purge supply of nitrogen to the TIP indexing mechanisms within containment. The Compressed Air System provides a purge supply of dry air to the TIP drive mechanisms outside of containment. The majority of the TIP System is not in scope for license renewal. However, the portions that maintain the primary containment boundary are in scope for license renewal.

For more detailed information, see UFSAR Section 7.7.6.4.

Boundary

The TIP system license renewal scoping boundary begins outside containment at the TIP drive mechanisms and includes the detectors, drive reel assembly, and drive and signal cable. The boundary continues to TIP guide tubes to detector shield chambers, shear valves, ball valves, and to the primary containment penetrations. Inside primary containment, the TIP guide tubes continue to the TIP indexing mechanisms, from which multiple TIP guide tubes continue to the reactor vessel. Included are the five-way connector (which provides a pathway for each indexing mechanism to send a detector to the same location for calibration), drive and signal cables, detectors, and electronic equipment necessary to obtain and process the TIP signals.

The portion of the TIP System that has primary containment boundary function is in scope for license renewal. This includes shear valves, ball valves, and TIP guide tubing from the shear valve assembly on each of the five TIP system trains, through the downstream ball valves to the primary containment penetration.

Not included in the TIP System scoping boundary are the dry tubes inside the reactor vessel which are evaluated with the Reactor Vessel Internals.

Not included in the TIP System scoping boundary are the TIP guide tube primary containment penetrations which are evaluated with the Primary Containment structure.

Not included in the TIP System are the valves and piping components that provide a nitrogen purge supply to the TIP indexing mechanisms which are evaluated with the Drywell Pneumatic System.

Not included in the TIP System are the valves and piping components that provide a dry air purge supply to the TIP drive mechanisms which are evaluated with the Compressed Air System.

Reason for Scope Determination

The Traversing Incore Probe System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Traversing Incore Probe System is not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Traversing Incore Probe System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide primary containment boundary. The TIP System ball valves, shear valves, and TIP tubing between the shear valves and the primary containment penetrations form a primary containment boundary. 10 CFR 54.4(a)(1)

UFSAR References

7.7.6.4
Table 3.2-1
Table 6.2-21

License Renewal Boundary Drawings

None.

Table 2.3.3-25 Traversing Incore Probe System
Components Subject to Aging Management Review

Component Type	Intended Function
Piping, piping components, and piping elements	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.3.2-25 Traversing Incore Probe System
Summary of Aging Management Evaluation

2.3.4 STEAM AND POWER CONVERSION SYSTEM

The following systems are addressed in this section:

- Condensate System (2.3.4.1)
- Condenser and Air Removal System (2.3.4.2)
- Feedwater System (2.3.4.3)
- Main Steam System (2.3.4.4)
- Main Turbine and Auxiliaries System (2.3.4.5)

2.3.4.1 <u>Condensate System</u>

<u>Description</u>

The Condensate System is a normally operating system designed to provide filtered and demineralized condensate from the condenser hotwell to the Feedwater System. The Condensate System also provides for the storage of clean and cycled condensate water for use in normal plant operations and refueling operations. The Condensate System consists of the following plant systems: acid feed, caustic handling, clean condensate, condensate, condensate booster, condensate polishing, cycled condensate gland water, and cycled condensate. The Condensate System is in scope for license renewal. However, portions of the Condensate System are not required to perform intended functions and are not in scope.

Acid Feed and Caustic Handling Systems

Acid and caustic are no longer used for resin regeneration at LaSalle. The acid and caustic storage and day tanks have been abandoned in place. The tanks contents have been removed and the tanks neutralized and cleaned. The tanks have been isolated, vented, and drained. Therefore, these tanks do not create the potential for spatial interaction and are not in scope for license renewal.

Clean Condensate System

The purpose of the clean condensate system is to provide clean (non-contaminated) reactor grade water to various plant systems. The clean condensate system accomplishes this by distributing clean condensate from the clean condensate storage tank to plant equipment and water service connections located in the Turbine Building, Radwaste Building, Offgas Building, Service Building, Auxiliary Building, Reactor Building, Diesel Generator Building, and other areas in the plant.

Clean condensate is also provided to water service connections inside the primary containment for use during reactor shutdown and outages. The clean condensate supply lines which penetrate the primary containment are equipped with manually operated primary containment isolation valves.

Condensate and Condensate Booster System

The purpose of the condensate and condensate booster systems is to provide a means of transferring water from the condenser hotwell to the suction of the reactor feed pumps. The condensate and condensate booster systems also provide cooling for the steam jet air ejectors, steam packing exhauster, offgas condenser, and low pressure heaters. The condensate and condensate booster systems accomplish this by taking suction from the condenser hotwell using the condensate pumps, delivering the condensate through the steam jet air ejector condensers, gland steam packing exhauster condensers, off-gas condensers, and condensate polishing system to the condensate booster pumps, which discharge through the low-pressure feedwater heaters to the reactor feed pumps.

Condensate Polishing System

The purpose of the condensate polishing system is to remove dissolved and suspended solids from the condensate in order to maintain high quality reactor feedwater. The condensate polishing system accomplishes this by processing condensate through prefilters and condensate demineralizers.

Cycled Condensate Gland Water System

The purpose of the gland water system is to provide gland water to various nonsafety-related plant pumps. The gland water system accomplishes this by providing cycled condensate from the cycled condensate gland seal head tank to each pump gland.

Cycled Condensate System

The purpose of the cycled condensate system is to provide the necessary source of condensate (potentially contaminated) to various systems in the plant and also to provide additional water for on-line and refueling activities. The cycled condensate system accomplishes this through the distribution of condensate from the cycled condensate storage tanks to various systems throughout the plant.

The cycled condensate storage tanks are credited for Fire Safe Shutdown as a suction source for the Reactor Core Isolation Cooling (RCIC) System for both the basic and alternate shutdown methods.

For more detailed information see UFSAR Sections 5.4.6.3, 6.2.4.2.2, 9.2.7, 10.4.6, and 10.4.7.

Boundary

The Condensate System license renewal scoping boundary includes that portion of the system necessary to achieve primary containment isolation. The clean condensate supply lines which penetrate the primary containment are equipped with manually operated primary containment isolation valves which are locked closed during reactor operations. In addition, each line is equipped with a spool piece which is removed and respective blank flanges installed during reactor operations.

The Condensate System license renewal scoping boundary also includes the cycled condensate storage tank and attached piping and valves necessary to maintain a usable supply volume for RCIC System operation. Not included in this boundary is the safety-related condensate storage tank level instrumentation that provides a low tank level signal to automatically swap the RCIC pump suction to the suppression pool. This instrumentation is evaluated with the RCIC System.

All associated piping, components and instrumentation contained within the boundaries described above are also included in the Condensate System scoping boundary.

Also included in the Condensate System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related to nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Primary Containment, Auxiliary Building, Reactor Building, Diesel Generator Building, Offgas Building, and Turbine Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Reason for Scope Determination

The Condensate System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Condensate System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Condensate System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Condensate System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide primary containment boundary. The clean condensate supply lines which penetrate the primary containment are equipped with manually operated primary containment isolation valves. 10 CFR 54.4(a)(1)

2. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Condensate System contains nonsafety-related fluid filled lines in the Primary Containment, Auxiliary Building, Reactor Building, Diesel Generator Building, Offgas Building, and Turbine Building which provide structural support or have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The cycled condensate storage tanks are credited for Fire Safe Shutdown as a suction source for the Reactor Core Isolation Cooling System (RCIC) for both the basic and alternate shutdown methods. 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.3.10
1.2.3.1.5
3.1.2.4.6
Table 3.2-1
Table 3.8-1
4.6.1.1.2.4.2.1
5.4.6.3
6.1.1.2
6.2.4.2.2
Table 6.2-21
7.4.1.2.2
9.1.3.2.3.6
9.2.4.1.2

9.2.7
10.4.6
10.4.7
11.2.2
15.9.3
Appendix J

License Renewal Boundary Drawings

LR-LAS-M-74, Sheet 1
LR-LAS-M-75, Sheets 1, 2, 3, 4
LR-LAS-M-77, Sheet 1
LR-LAS-M-113, Sheet 1
LR-LAS-M-127, Sheet 1
LR-LAS-M-86, Sheet 1
LR-LAS-M-89, Sheet 1
LR-LAS-M-90, Sheet 1
LR-LAS-M-96, Sheets 1, 2, 3
LR-LAS-M-97, Sheets 1, 5
LR-LAS-M-98, Sheet 1
LR-LAS-M-99, Sheet 1
LR-LAS-M-100, Sheet 1
LR-LAS-M-102, Sheets 1, 10
LR-LAS-M-103, Sheets 15, 16, 19, 27
LR-LAS-M-105, Sheet 1
LR-LAS-M-115, Sheets 1, 12, 13
LR-LAS-M-129, Sheet 3
LR-LAS-M-130, Sheets 1, 2
LR-LAS-M-133, Sheet 1
LR-LAS-M-136, Sheet 1
LR-LAS-M-142, Sheets 1, 2, 3
LR-LAS-M-143, Sheets 1, 5
LR-LAS-M-144, Sheet 1
LR-LAS-M-145, Sheet 1
LR-LAS-M-146, Sheet 1
LR-LAS-M-159, Sheet 1

Table 2.3.4-1 **Condensate System**
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Tanks (Cycled Condensate Gland Seal Head Tank)	Leakage Boundary
Tanks (Cycled Condensate Storage Tank)	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.4.2-1 Condensate System
Summary of Aging Management Evaluation

2.3.4.2 Condenser and Air Removal System

Description

The Condenser and Air Removal System is a normally operating system designed to provide a heat sink for exhaust steam from the main turbine and reactor feed pump turbines during normal operation. The system also removes noncondensible gases from the condenser and exhausts them to the gaseous radwaste system. The system has a function to provide passive hold-up for leakage from the main steam isolation valves following an accident and isolate the main condenser off-gas outlet lines upon detection of high radiation in the main steam lines when the mechanical vacuum pump is operating. The Condenser and Air Removal System consists of the following plant systems: main condenser and main condenser evacuation system. The Condenser and Air Removal System is in scope for license renewal. However, portions of the Condenser and Air Removal System are not required to perform intended functions and are not in scope.

Main Condenser

The purpose of the main condenser is to provide a heat sink for turbine exhaust steam, turbine bypass steam, and other turbine cycle flows, and to receive and collect flows for return to the reactor. The main condenser accomplishes these functions by passing circulating water through the condenser tubes to condense the steam from turbine exhausts and other sources, removing noncondensible gases during normal operation and plant startup, and providing a volume for collection and storage of condensate to be returned to the reactor. Attached to the main condenser is safety-related and environmentally qualified instrumentation to sense loss of condenser vacuum and initiate closure of the MSIVs and main steam line drains. The condenser also provides passive hold-up and plateout of radioactive material that leaks through the main steam isolation valves following a LOCA by receiving input from drains for the main steam lines.

Condenser Evacuation System

The purpose of the condenser evacuation system is to maintain a vacuum in the condenser for the three low pressure turbine exhausts. The system accomplishes this function by removing the noncondensible gases from the condenser, including air inleakage and dissociation products originating in the reactor, and discharging them to the gaseous radwaste system. The system also functions to minimize the release of radioactivity to the environment following a control rod drop accident. It accomplishes this function by manual isolation of the main condenser off-gas outlet isolation valves and manual trip of the mechanical vacuum pump when high radiation is detected in the main steam lines when the mechanical vacuum pump is in operation.

For more detailed information see UFSAR Sections 6.8, 7.3.2.2.3.12, 10.4.1, 10.4.2, 15.4.9, and 15.6.5.

Boundary

The license renewal scoping boundary of the Condenser and Air Removal System includes the main condenser and the off-gas air ejector supply piping from the condenser up to and including the main condenser off-gas outlet isolation valves. The scoping boundary also includes the safety-related main condenser vacuum instrumentation that initiates isolation of the MSIVs and main steam line drains upon loss of condenser vacuum.

All associated piping, components, and instrumentation contained within the boundaries described above is included in the Condenser and Air Removal System scoping boundary.

For more information, refer to the License Renewal Boundary Drawings for identification of these components, shown in green.

Not included in the Condenser and Air Removal System scoping boundary are the main steam line drains that route MSIV leakage from the steam lines to the condenser for holdup and plateout which are evaluated with the Main Steam System.

Not included in the Condenser and Air Removal System scoping boundary are the low pressure turbine exhaust hoods, which form a portion of the post-accident holdup boundary with the main condenser and are evaluated with the Main Turbine and Auxiliaries System.

Reason for Scope Determination

The Condenser and Air Removal System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Condenser and Air Removal System is not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Condenser and Air Removal System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Condenser and Air Removal System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. Main condenser low vacuum instrumentation initiates MSIV closure and main steam line drain isolation. 10 CFR 54.4(a)(1)

2. Post-accident containment holdup and plate out of MSIV bypass leakage. The main condenser is credited for holdup and plateout of MSIV leakage following a LOCA. 10 CFR 54.4(a)(2)

3. Minimize the release of radioactive material to the environment. Manual isolation of the main condenser off-gas outlet valves and manual tripping of the mechanical vacuum pump is credited following a control rod drop accident to minimize radioactive releases. 10 CFR 54.4(a)(2)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Condenser and Air Removal System includes environmentally qualified pressure switches to sense loss of condenser vacuum and initiate closure of the MSIVs and main steam line drains. 10 CFR 54.4(a)(3)

UFSAR References

1.2.3.1.3
3.2
6.8
7.3.2.2.3.12
10.4.1
10.4.2
15.4.9
15.6.5.5
15.7.1

License Renewal Boundary Drawings

LR-LAS-M-56, Sheets 2, 3, 4
LR-LAS-M-117, Sheets 2, 3, 4
LR-LAS-M-80, Sheet 2
LR-LAS-M-128, Sheet 2
LR-LAS-M-88, Sheet 1
LR-LAS-M-135, Sheet 1

Table 2.3.4-2 Condenser and Air Removal System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Heat Exchanger - (Main Condenser) Shell Side Components	Containment, Holdup and Plateout
Piping, piping components, and piping elements	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.4.2-2 Condenser and Air Removal System
Summary of Aging Management Evaluation

2.3.4.3 Feedwater System

Description

The Feedwater System is a normally operating system designed to provide a dependable supply of high quality feedwater to the reactor vessel. The Feedwater System consists of the following plant systems: feedwater, feedwater heaters and drains, feedwater miscellaneous drains, feedwater control, zinc injection, hydrogen, and hydrogen water chemistry. The Feedwater System is in scope for license renewal. However, portions of the Feedwater System are not required to perform intended functions and are not in scope.

Feedwater

The purpose of the feedwater system is to provide feedwater at the required flow, pressure, and temperature to the reactor vessel. The feedwater system accomplishes this by taking high quality, preheated feedwater from the feedwater heaters and injecting the feedwater into the reactor vessel using motor or turbine driven reactor feed pumps.

The feedwater system includes a safety-related and environmentally qualified motor-operated primary containment isolation valve installed upstream of the feedwater injection line primary containment isolation check valves (evaluated with the Reactor Coolant Pressure Boundary System). The check valves provide for immediate isolation should a break occur in the feedwater line outside of the primary containment. The motor-operated valve provides for long-term leakage protection and isolation capability.

Feedwater Heaters and Drains/Feedwater Miscellaneous Drains

The purpose of the feedwater heaters and drains is to recover thermal energy for preheating feedwater to increase the thermal efficiency of the plant. The feedwater heaters and drains accomplish this by using cascading drains and extraction steam to heat reactor feedwater through the use of feedwater heaters.

Feedwater Control

The purpose of the feedwater control system is to automatically control the flow of feedwater into the reactor vessel to maintain the water level in the vessel within predetermined levels over the entire power range of the reactor. The feedwater control system accomplishes this by using a three-element controller to regulate the feedwater flow. The controller uses main steam flow rate, feedwater flow rate, and reactor water level. The feedwater control signal maintains a predetermined level by varying the speed of the turbine driven feed pumps and/or by varying the flow control valve position on the discharge of the constant speed motor driven feed pump. Operation in a single element control that utilizes reactor water level only is also available.

Zinc Injection

The purpose of the zinc injection system is to reduce dose rates in the reactor recirculation piping by reducing the level of cobalt that is incorporated into the iron oxide layers on the recirculation piping. The zinc injection system accomplishes this by injecting a solution of depleted zinc oxide into the suction header of the reactor feed pumps using a zinc injection skid.

Hydrogen System

The purpose of the hydrogen system is to provide a source of hydrogen for hydrogen water chemistry. The hydrogen system accomplishes this by providing regulated hydrogen from a cryogenic hydrogen storage facility to the hydrogen water chemistry injection system.

Hydrogen Water Chemistry System

The purpose of the hydrogen water chemistry system is to reduce rates of intergranular stress corrosion cracking (IGSCC) in recirculation piping and reactor vessel internals. The hydrogen water chemistry system accomplishes this by injecting hydrogen into the condensate booster pump suction header (evaluated with the Condensate System) to suppress the formation of radiolytic oxygen in the reactor coolant.

For more detailed information see UFSAR Sections 5.4.15, 6.2, 7.7.4, and 10.4.7

Boundary

The Feedwater System license renewal scoping boundary includes that portion of the system necessary to achieve primary containment isolation and maintain reactor coolant system pressure boundary. The feedwater primary containment penetrations are provided with a series arrangement of three isolation valves. The scoping boundary begins with the outer feedwater inlet outboard motor-operated containment isolation valve and continues up to, but does not include, the inner outboard containment isolation check valve located immediately outside of the containment. The inner outboard containment isolation check valve is evaluated with the Reactor Coolant Pressure Boundary System.

All associated piping, components and instrumentation contained within the boundaries described above are also included in the Feedwater System scoping boundary.

Also included in the Feedwater System scoping boundary are those portions of nonsafety-related piping and equipment that extend beyond the safety-related to nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building, Auxiliary Building, and Turbine Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the scope of license renewal are the heaters and drains, zinc injection, hydrogen supply and hydrogen water chemistry portions of the system, as these portions of the system are either gas filled or liquid filled, are not located in areas where there are potential spatial interactions with components performing safety-related functions, and do not perform or support an intended function.

Not included in the scope of license renewal is the feedwater control portion of the system. The feedwater control system is an operational control system which has no safety function, and does not perform or support an intended function.

Reason for Scope Determination

The Feedwater System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Feedwater System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Feedwater System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Feedwater System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide primary containment boundary. The Feedwater System includes safety-related motor-operated primary containment isolation valves in the feedwater inlet lines to the reactor. 10 CFR 54.4(a)(1)

2. Provide reactor coolant pressure boundary. The Feedwater System includes safety-related motor-operated valves in the feedwater inlet lines to the reactor to provide long-term leakage control in the event of a piping failure in the Feedwater System. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Feedwater System contains nonsafety-related fluid filled lines in the Reactor Building, Auxiliary Building, and Turbine Building which provide structural support or have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Feedwater System motor-operated primary containment isolation valves include components that are environmentally qualified. 10 CFR 54.4(a)(3)

UFSAR References

1.2.3.1.5
1.2.3.3.2
Table 3.2-1
5.4.9
5.4.15
6.2.4.2.1
Table 6.2-21
Table 6.2-28
7.7.4
9.5.1.2.2
10.3.6
10.4.7
10.4.8

Appendix C
Appendix J.1

License Renewal Boundary Drawings

LR-LAS-M-57, Sheet 1
LR-LAS-M-118, Sheet 1

Table 2.3.4-3 Feedwater System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.4.2-3 Feedwater System
Summary of Aging Management Evaluation

2.3.4.4 Main Steam System

Description

The Main Steam System is a normally operating system that is designed to convey steam produced in the reactor to the main turbine and direct steam from the main steam relief valve discharge to the suppression pool. The Main Steam System consists of the following plant systems: main steam system and MSIV leakage control system. The Main Steam System includes the MSIV Isolated Condenser Leakage Treatment Method components that control and minimize the release of fission products which could leak through the closed main steam isolation valves after a LOCA. The Main Steam System is in scope for license renewal. However, portions of the system are not required to perform intended functions and are not in scope.

The purpose of the Main Steam System is to provide the high pressure steam produced by the reactor to the main turbine during normal plant operation. It accomplishes this function via the four main steam lines between the outboard primary containment isolation valves, the main turbine stop valves, and the main turbine bypass valves.

The purpose of the Main Steam System is to also provide the capability to bypass steam around the main turbine. It accomplishes this by operation of main turbine bypass valves that discharge to the main condenser. The purpose of the Main Steam System is also to provide steam to users such as reactor feed pump turbines, steam jet air ejectors, offgas preheaters, second stage reheaters, and steam seal evaporator. It accomplishes this function by providing high pressure steam, from upstream of the main turbine stop valves to flow or pressure control valves at each of the steam users.

The Main Steam System also includes the discharge piping from the main steam relief valves inside the primary containment. The purpose of this portion of the Main Steam System is to route the MSRV discharge to the suppression pool to minimize the thermal effects of opening the relief valves. It accomplishes this function by routing the steam from the MSRV into the suppression pool, below the normal water level, to a quencher to facilitate condensation of the steam. Several of the discharge lines are no longer used for MSRV steam discharge and are installed in the primary containment and capped in the drywell to prevent bypass leakage between the drywell and suppression pool air space.

The purpose of the Main Steam System is also to contain main steam isolation valve leakage following a LOCA. It accomplishes this function by providing a volume within the large diameter main steam piping for plateout and holdup and a flow path through main steam drain lines to the main condenser for additional plateout and holdup in the condenser. The Main Steam System includes the station main steam isolation valve leakage control system which is abandoned in place for Unit 1 and deleted for Unit 2.

Portions of the Main Steam System are located in areas where there are potential spatial interactions with safety-related equipment in the Reactor Building. The intended function of these portions of the Main Steam System is to resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of the safety-related functions of the safety-related SSC.

For more detailed information see UFSAR Sections 3.2, 6.7, 6.8, 10.3, and 15.6.

<u>Boundary</u>

The license renewal scoping boundary of the Main Steam System includes the main steam lines from the outboard containment isolation valves up to and including the main turbine stop valves, main turbine bypass valves, and isolation valves to steam users.

The license renewal scoping boundary of the Main Steam System also includes instrumentation that is part of the plant reactor protection system, including turbine stop valve closure, turbine control valve fast closure, and turbine first stage pressure.

The main steam piping from the reactor vessel to, and including, the outboard MSIVs and the MSRVs, is not included in the Main Steam System and is evaluated with the Reactor Coolant Pressure Boundary System for license renewal.

The main turbine control valves and downstream piping are also not included in the scope of the Main Steam System and are evaluated with the Main Turbine and Auxiliaries System for license renewal.

The license renewal scoping boundary of the Main Steam System also includes the safety-related MSRV discharge piping that is connected to the MSRVs as well as the MSRV discharge piping that is capped in the drywell and no longer used.

The license renewal scoping boundary of the Main Steam System includes the MSIV isolated condenser leakage treatment method. This includes nonsafety-related drain lines from the main steam lines outside the primary containment to the main condenser. The main condenser is not included in the scope of the Main Steam System and is evaluated with the Condenser and Air Removal System for license renewal.

The plant MSIV leakage control system is part of the Main Steam System. This system is deleted for Unit 2 and abandoned in place for Unit 1. This portion of the Main Steam System for Unit 1 does not perform any license renewal intended function, has been physically disconnected from the main steam lines and drained, and is not in the scope of license renewal. The function of this plant system is performed by the MSIV isolated condenser leakage treatment method.

All associated piping, components, and instrumentation contained within the boundaries described above are also included in the Main Steam System scoping boundary.

Also included in the license renewal scoping boundary for the Main Steam System are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point where there is no longer the potential for spatial interaction with safety-related equipment, whichever extends furthest. This includes the nonsafety-related portions of the system located in the Reactor Building. Included in this boundary are pressure-retaining components that are relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Reason for Scope Determination

The Main Steam System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. The Main Steam System meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Main Steam System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Main Steam System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The Main Steam System contains reactor protection system instrumentation that initiates reactor scram or turbine trip. 10 CFR 54.4(a)(1)

2. Provide emergency heat removal from primary containment and provide containment pressure control. The Main Steam System includes the MSRV discharge piping which prevents bypass leakage between the drywell and suppression pool and routes MSRV discharge to the suppression pool. 10 CFR 54.4(a)(1)

3. Post-accident containment holdup and plateout of MSIV bypass leakage. The Main Steam System contains leakage from MSIVs and routes the leakage to the main condenser for holdup and plateout prior to release following LOCA. 10 CFR 54.4(a)(2)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Main Steam System includes nonsafety-related SSCs with the potential for spatial and structural interaction with safety-related SSCs in the Reactor Building. 10 CFR 54.4(a)(2)

5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Main Steam System includes the MSRV discharge piping which is used to reduce and control reactor pressure to support Fire Safe Shutdown. 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Main Steam System contains reactor protection instrumentation that is subject to the requirements of 10 CFR 50.49, the EQ rule. 10 CFR 54.4(a)(3)

7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). The Main Steam System includes the MSRV discharge lines which are used during station blackout to reduce and control reactor pressure. 10 CFR 54.4(a)(3)

UFSAR References

1.2.3.1.2
1.2.2.4.5
3.2
5.4.9
6.7
6.8
7.2
10.3
15.2.6
15.6.5.5
15.9.3

License Renewal Boundary Drawings

LR-LAS-M-55, Sheets 1, 2, 3, 7
LR-LAS-M-92, Sheet 1
LR-LAS-M-116, Sheets 1, 2, 3, 7
LR-LAS-M-138, Sheet 1

Table 2.3.4-4 Main Steam System
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in:

Table 3.4.2-4 Main Steam System
Summary of Aging Management Evaluation

2.3.4.5 Main Turbine and Auxiliaries System

Description

The Main Turbine and Auxiliaries System is a normally operating system designed to convert the thermal energy in the steam supplied from the reactor into rotational mechanical energy. The Main Turbine and Auxiliaries System consists of the following subsystems: turbine-generator, gland seal steam system, turbine lube oil system, electro-hydraulic control system, turbine test system and portions of the main steam system. The Main Turbine and Auxiliaries System is in scope for license renewal, however, portions of the system are not required to perform intended functions and are not in scope.

Main Turbine

The main turbine consists of one double-flow high pressure and three double-flow low pressure turbines on the same shaft. The turbine system also includes two (2) horizontal moisture separator reheaters and associated piping running from the main turbine control valves and ending at the low pressure turbine inlets. The purpose of the main turbine is to convert the thermal energy in the steam produced by the reactor into rotational mechanical energy for use by the main generator in producing electricity and to provide a passive holdup volume in conjunction with the main condenser following an accident for any leakage through the Main Steam Isolation Valves (MSIV). It accomplishes the first purpose by passing main steam through the turbine blade stages to turn the turbine rotors which are coupled directly to the generator shaft. It accomplishes the second purpose using the exhaust hoods of the low pressure turbines which are mounted on the top of the main condenser to form the boundary for holdup of MSIV leakage.

Gland Seal Steam

The purpose of the sealing steam system is to provide a source of clean (low level radioactivity) steam to the shaft seals for the main high and low pressure turbine rotors, shaft seals for the reactor feed pump turbine rotors, and large main steam valves including the main turbine stop valves, main turbine control valves, main turbine bypass valves, combined intermediate valves, and reactor feed pump turbine stop and control valves. It accomplishes this by heating condensate during power operation in the steam seal evaporator. The seal steam keeps radioactive steam inside the sealed components while keeping outside air from penetrating the seals.

Turbine Lube Oil

The purpose of the lube oil system is to provide clean pressurized oil to the main turbine thrust bearing, main turbine journal bearings, lift pump suction, hydrogen seal oil and reactor feed pump turbine control system and bearings. It accomplishes this by purifying the lube oil and providing the pressurized oil to the selected users and returning it to the purification equipment.

Electro-Hydraulic Control (EHC) system

The purpose of the EHC system is to provide hydraulic fluid for control of main steam header pressure, turbine speed, and steam flow during normal operating and transient conditions. It accomplishes this by positioning the main steam stop valves, control valves, combined intermediate valves, and bypass valves.

Turbine Test

The purpose of turbine test system is to provide various system connection points such that thermal performance testing can be performed on the turbine assembly. It accomplishes this by installed instrumentation connection points to monitor process variables in the Main Turbine and Auxiliaries System. This system is only installed on Unit 2 and is used to perform ASME performance testing on newly installed turbine components.

For more detailed information, see UFSAR Section 10.2.

Boundary

The Main Turbine and Auxiliaries System scoping evaluation boundary begins at the outlet side of the turbine main stop valves. The scoping boundary continues through the high pressure turbine, the moisture separator reheaters, and then the low pressure turbines. It includes the piping from the outlet of the turbine bypass valves and ends at the inlets to the main condenser. The scoping boundary also includes the EHC system components which begin at the EHC reservoir. The scoping boundary continues through the system supply piping, the hydraulic valve actuators on the main turbine valves and the system return piping. The scoping boundary ends where the system return piping returns to the EHC reservoir. The scoping boundary also includes the components associated with the turbine oil system. The scoping boundary begins at the main turbine oil reservoir. The scoping boundary continues through the system supply piping to various components including the main turbine bearings, the supply to the seal oil skid, and the system return piping. The scoping boundary ends where the system return piping enters the main turbine oil reservoir. The gland steam system begins at the inlet to the steam seal evaporator, continues through system piping to turbine shaft seals, the steam packing exhauster, and ends at the outlet pipe connecting to the main stack. The system boundary also includes sealing steam supplies to various main turbine and feed pump turbine valve stem seals and ends where the piping system connects to the condenser. All associated piping, components and instrumentation, contained within the flowpath described above, are included in the system boundary evaluation unless specifically excluded.

The Main Turbine and Auxiliaries System scoping boundary encompasses those components that perform an intended function as part of the MSIV alternate treatment leakage paths. This includes the low pressure turbine exhaust hoods that in combination with the main condenser provide for passive holdup and plateout of MSIV leakage following a design basis LOCA. For more information, refer to the License Renewal Boundary Drawings for the identification of this boundary shown in green.

Not included in the Main Turbine and Auxiliaries System scoping boundary is the instrumentation within the Main Turbine and Auxiliaries System boundary associated with the Reactor Protection System which is evaluated with the Main Steam System.

Reason for Scope Determination

The Main Turbine and Auxiliaries System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety-related or relied upon to remain functional during and following design basis events. The Main Turbine and Auxiliaries System meets 10 CFR

54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Main Turbine and Auxiliaries System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Post-accident containment holdup and plateout of MSIV bypass leakage. Credit is taken for holdup and plateout in the main condenser for MSIV leakage. The low pressure turbine exhaust hoods form part of this holdup boundary with the main condenser. 10 CFR 54.4(a)(2)

UFSAR References

6.8
7.7.5
10.2
10.4.3
10.4.4

License Renewal Boundary Drawings

LR-LAS-M-55, Sheet 4
LR-LAS-M-116, Sheet 4

Table 2.3.4-5 Main Turbine and Auxiliaries System
Components Subject to Aging Management Review

Component Type	Intended Function
Turbine Casings (Low Pressure Turbine Exhaust Hoods)	Containment, Holdup and Plateout

The aging management review results for these components are provided in:

Table 3.4.2-5 Main Turbine and Auxiliaries System
Summary of Aging Management Evaluation

2.4 SCOPING AND SCREENING RESULTS: STRUCTURES AND COMPONENT SUPPORTS

The following structural components are addressed in this section:

- Auxiliary Building (2.4.1)
- Component Supports Commodity Group (2.4.2)
- Cooling Lake (2.4.3)
- Diesel Generator Building (2.4.4)
- Lake Screen House (2.4.5)
- Offgas Building (2.4.6)
- Primary Containment (2.4.7)
- Radwaste Building (2.4.8)
- Reactor Building (2.4.9)
- Structural Commodity Group (2.4.10)
- Switchyard Structures (2.4.11)
- Tank Foundations and Dikes (2.4.12)
- Turbine Building (2.4.13)
- Yard Structures (2.4.14)

2.4.1 Auxiliary Building

Description

The Auxiliary Building is a Seismic Category I safety-related multi-story structure. Portions of the structure are constructed above and below grade.

The structure is a part of the power generation complex which includes several contiguous buildings. The Auxiliary Building is located west of the Seismic Class I safety-related Reactor Building, and east of the Turbine Building. The Diesel Generator Buildings are located north and south of the Auxiliary Building. The shear walls for the Reactor Building, Auxiliary Building, Turbine Building, Radwaste Building, Diesel Generator Buildings, and Off-gas Filter Building are interconnected. These shear walls have been considered to act together to resist lateral loads applied to these buildings. Therefore, the shear walls for these buildings are Seismic Category I.

The Auxiliary Building is comprised of a reinforced concrete shear wall structure supported on a reinforced concrete mat foundation on soil which is continuous with the mat foundation under the reactor, turbine, and diesel generator buildings. Above the mat the Auxiliary Building is structurally integral with the reactor and turbine buildings. The lower levels of the Auxiliary Building are continuous, two-way slab and beam construction. The floor levels above grade are steel framing with concrete slabs. Exterior walls are reinforced concrete. Interior partitioning consists of reinforced concrete and concrete block walls. The roof is galvanized metal decking with portions consisting of reinforced concrete and built-up roofing.

The station ventilation stack is located on the Auxiliary Building roof and serves as a single point of release for the Reactor Building, Turbine Building and Radwaste Building ventilation as well as off-gas standby gas treatment and plant gland seal exhaust systems. The stack is a steel structure and it is designed to withstand postulated seismic and tornado conditions. The roof also supports exhaust vent lines leading to the vent stack.

The Auxiliary Building houses the main steam tunnel, Turbine Building access elevator, vent stack, HVAC equipment, laboratories, electrical equipment, 4160-volt and 6900-volt switchgear, 480-volt substation, battery rooms, instrument room, computer room, control room and offices, and facilities for shift operating personnel.

The Auxiliary Building is divided into compartments designed to protect Unit 1 and Unit 2 safety-related systems and components. Among these compartments are the control room envelope, switchgear compartments, and miscellaneous equipment compartments.

The control room envelope consists of control room and auxiliary electric equipment rooms for both Units 1 and 2, control room toilet and the main security control center. Air handling units, filter trains, ducts and dampers are also part of the control room envelope. Safe occupancy of the control room during abnormal conditions is provided for in the design. Adequate shielding is provided to maintain acceptable radiation levels in the control room in the event of a design basis accident for the duration of the accident. The control room is protected by a minimum of 2 feet of concrete shielding. The outside air for the control room supply is brought in through independent and separate missile-protected roof openings. The control room is isolated from the Turbine Building through leak tight double doors.

The purpose of the Auxiliary Building is to provide structural support, shelter and protection to systems, structures and components (SSCs) along with personnel housed within the building during normal plant operations, and during and following postulated design basis accidents and extreme environmental conditions. The building also contains the control room, which is the main operation center for the plant providing a centralized area for control and monitoring of safety-related and nonsafety-related equipment throughout the station. The control room envelope in conjunction with the ventilation system provides a habitable environment for plant operators so that the plant can be safely operated and shutdown under design basis accident conditions. The Auxiliary Building also supports and protects both safety and nonsafety-related equipment.

Included in the boundary of the Auxiliary Building are blowout panels, concrete anchors, concrete embedments, curbs, equipment supports and foundations, hatches, plugs, masonry walls, metal components such as the control room ceiling, metal decking, pipe whip restraints, reinforced concrete elements of the building, steel components, steel elements (including the ventilation stack), and structural bolting.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Auxiliary Building.

Included within the boundary of the Auxiliary Building and determined not to be within the scope of license renewal are certain architectural elements in the miscellaneous operational support areas such as the computer room and labs that include drywall partitions and soffits, and suspended ceilings. These components and structures are nonsafety-related, and are provided to facilitate miscellaneous operational support. These components and structures do not perform a license renewal intended function, such that their failure will not prevent satisfactory accomplishment of a safety-related function.

Not included within the evaluation boundary of the Auxiliary Building are the fire barriers, component supports, and structural commodities. Fire barriers are evaluated separately with the Fire Protection System. Component supports, including their respective bolting, are evaluated with the Component Supports Commodity Group. Structural commodities, including their respective bolting, are evaluated with the Structural Commodity Group. The Structural Commodity Group evaluates components such as bird screens; cable trays; compressible joints and seals; conduit; doors; piping and component insulation and insulation jacketing; louvers; miscellaneous structural steel including platforms, stairs, ladders; panels, racks, cabinets, and other enclosures for electrical equipment and instrumentation; penetration seals; penetration sleeves including end caps; roofing; structural sealants, seismic gap seals, gaskets, flashing and other sealants and gap seals; and tube track. In addition, mechanical and electrical systems and components housed in or located within the Auxiliary Building are evaluated with their respective mechanical and electrical license renewal system or commodity group.

For more detailed information, see UFSAR Sections 3.8.4 and 3.8.5

Reason for Scope Determination

The Auxiliary Building meets 10 CFR 54.4(a)(1) because it is a safety-related structure that is relied upon to remain functional during and following design basis events. The Auxiliary Building meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Auxiliary Building also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide physical support, shelter, and protection for safety-related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)

2. Provide centralized area for control and monitoring of nuclear safety-related equipment. 10 CFR 54.4(a)(1)

3. Provides for the discharge of treated gaseous waste to meet the requirements of 10 CFR 50.67 or 10 CFR 100. 10 CFR 54.4(a)(1)

4. Controls the potential release of fission products to the external environment so that offsite consequences of design basis events are within acceptable limits. 10 CFR 54.4(a)(1)

5. Provides physical support, shelter, and protection for nonsafety-related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

6. Provides structural support or restraint to SSCs not in scope of license renewal to prevent interaction with safety-related SSCs. 10 CFR 54.4(a)(2)

7. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

8. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

9. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transients Without Scram (10 CFR 50.62). 10 CFR 54.4(a)(3)

10. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that

demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

1.1
1.2.2.2
Table 3.2-1
3.5.2.2
Figure 3.5-4
3.8.1.4.2
3.8.4
3.8.4.1
3.8.4.1.2
3.8.4.1.4
3.8.4.1.6.1
3.8.5
3.8.5.1.1
6.4.2
9.5.1.2.2
12.3.1.5

License Renewal Boundary Drawings

LR-M-3

Table 2.4-1 Auxiliary Building
Components Subject to Aging Management Review

Component Type	Intended Function
Blowout Panels	Pressure Relief
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Concrete: Below-grade Exterior	Flood Barrier

Component Type	**Intended Function**
(accessible areas)	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Pressure Barrier
	Structural Support
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Component Type	Intended Function
Concrete: Interior	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Equipment Supports and Foundations	Structural Support
Hatches/Plugs	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Support
Masonry Walls: Interior	Shelter, Protection
	Shielding
	Structural Support
Metal Components (Including Control Room Ceiling)	Structural Support
Metal Decking	Structural Support
Pipe Whip Restraints	Pipe Whip Restraint
Steel Components: Structural Steel	Structural Support
Steel Elements (Ventilation Stack)	Gaseous Release Path
	Structural Support
Steel Elements: Liner, Liner Anchors, Integral Attachments (accessible areas - Sump)	Water Retaining Boundary

The aging management review results for these components are provided in:

Table 3.5.2-1 Auxiliary Building
Summary of Aging Management Evaluation

2.4.2 Component Supports Commodity Group

Description

The Component Supports Commodity Group consists of structural elements and specialty components designed to transfer the load applied from a system, structure, or component (SSC) to the building structural element or directly to the building foundation. Supports include seismic anchors or restraints, support frames, constant and variable spring hangers, rod hangers, guides, stops, straps, and clamps. Specialty components include snubbers, and sliding surfaces.

The commodity group is comprised of the following supports:

- Supports for ASME Class 1, 2, and 3, and MC piping and components, including reactor vessel anchorage.

- Supports for cable trays, conduit, HVAC ducts, tube track, instrument tubing and non-ASME piping and components.

- Supports for emergency diesel generators, HVAC system components and other miscellaneous mechanical equipment.

- Supports for platforms, spray shields, and other miscellaneous structures.

- Supports for racks, panels, cabinets and enclosures for electrical equipment and instrumentation.

The purpose of a support is to transfer loads such as gravity, thermal, seismic, and other lateral and vertical loads imposed on, or by the system, structure, or component to the supporting building structural element or foundation. Sliding surfaces when incorporated into the support design permit release of lateral forces but are relied upon to provide vertical support. Specialty supports such as snubbers only resist seismic forces. Vibration isolators are incorporated in the design of some vibrating equipment to minimize the impact of vibration. Other support types such as guides and position stops allow displacement in a specified direction or preclude unacceptable movements and interactions.

The Component Supports Commodity Group includes supports for mechanical, electrical and instrumentation systems, components, and structures that are within the scope of license renewal. The group also includes supports for SSCs, which are not within the scope of license renewal, but their supports are required to restrain or prevent physical interaction with safety-related SSCs (e.g. Seismic II over I). The supports include support members, welded and bolted connections, sliding surfaces and bearings, concrete anchors, concrete embedments, and grout.

Included in the boundary of the Component Supports Commodity Group for each of the supports indicated above are building concrete at locations of expansion and grouted anchors, grout pads for support base plates; constant and variable load spring hangers, guides, stops; support members, sliding surfaces, welds, bolted connections, and support anchorage to building structure. Snubbers are also included in the boundary of this commodity group; however, they are considered active components and are not subject to aging management review except for the end connections, which perform a passive function for structural support.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Component Supports Commodity Group.

Not included in the boundary of the Component Supports Commodity Group are concrete equipment foundations, pipe whip restraints, columns, concrete embedments, and concrete anchors used for components other than supports listed herein. These commodities are evaluated separately with the license renewal structure that contains them.

For more detailed information, see UFSAR Sections Table 3.2-1, 3.6.2.3.2, 3.6.2.3.2.6, 3.6.2.3.3, 3.7.3.3, 3.9.2, and 3.9.3.

Reason for Scope Determination

The Component Supports Commodity Group meets 10 CFR 54.4(a)(1) because it is a safety-related supports that is relied upon to remain functional during and following design basis events. The Component Supports Commodity Group meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the supports could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Component Supports Commodity Group also meets 10 CFR 54.4(a)(3) because supports are relied upon in the safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provides structural support or restraint to SSCs in scope of license renewal.
10 CFR 54.4(a)(1), (a)(2), (a)(3)

2. Provides structural support or restraint to SSCs not in scope of license renewal to prevent interaction with safety-related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

Table 3.2-1
3.6.2.3.2
3.6.2.3.2.6
3.6.2.3.3
3.7.3.3
3.9.2
3.9.3
3.10
8.3.1
Appendix G.2
Appendix J.3

License Renewal Boundary Drawings

LR-M-3

Table 2.4-2 **Component Supports Commodity Group**
Components Subject to Aging Management Review

Component Type	Intended Function
Supports for ASME Class 1 piping and components (Building concrete at locations of expansion and grouted anchors; grout pads for support base plates)	Structural Support
Supports for ASME Class 1 piping and components (Constant and variable load spring hangers; guides; stops)	Structural Support
Supports for ASME Class 1 piping and components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support
Supports for ASME Class 2 and 3 piping and components (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support
Supports for ASME Class 2 and 3 piping and components (Constant and variable load spring hangers; guides; stops)	Structural Support
Supports for ASME Class MC components (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support
Supports for ASME Class 2 and 3 piping and components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support
Supports for ASME Class MC components (Constant and variable load spring hangers; guides; stops)	Structural Support
Supports for ASME Class MC components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support
Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support

Component Type	Intended Function
Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support
Supports for Emergency Diesel Generator, HVAC System Components, and Other Misc. Mechanical Equipment (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support
Supports for Emergency Diesel Generator, HVAC System Components, and Other Misc. Mechanical Equipment (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support
Supports for Platforms, Jet Impingement Shields, Masonry Walls, and Other Misc. Structures (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support
Supports for Platforms, Jet Impingement Shields, Masonry Walls, and Other Miscellaneous Structures (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support
Supports for Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support
Supports for Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support

The aging management review results for these components are provided in:

Table 3.5.2-2 Component Supports Commodity Group Summary of Aging Management Evaluation

2.4.3 Cooling Lake

Description

The Cooling Lake is located over 800 feet east of the power block building complex. The Cooling Lake evaluation boundary includes the Cooling Lake embankment (including discharge structure and discharge flume), submerged core standby cooling system (CSCS) pond and intake flume (ultimate heat sink), CSCS pipeline outfall structure, makeup pipeline outfall structure and makeup and blowdown valve house, service spillway (which is also known as the blowdown intake structure), and the auxiliary spillway.

Cooling Lake Embankment (including discharge structure and discharge flume):

The 2058 acre Cooling Lake was constructed by excavation of the local soil. The west side of the shore line (plant side) is made up of natural topography. The lake also has peripheral dike embankments comprised of soil, crushed stone, and riprap on the north, east, and south sides. The Cooling Lake embankments, which are also described as peripheral dikes, are designed to contain the Cooling Lake water level at a normal water level of 700’ MSL which is 10 feet below plant grade. The purpose of the Cooling Lake is to provide a source of cooling water for the Nonessential Cooling Water System which includes the circulating water and service water systems. A discharge structure is located west of the power block and the connected discharge flume returns cooling water from the Nonessential Cooling Water System to the Cooling Lake during normal plant operations. The Cooling Lake has an internal dike system to increase the flow path of returning warm water for efficient heat dissipation. Failure of the Cooling Lake embankment and internal dikes (including the discharge structure and discharge flume) does not affect any license renewal intended function and does not affect the ultimate heat sink. Failure of the Cooling Lake embankment would not result in flooding of plant facilities since plant grade and floor elevations are 710 feet and 710.5 feet respectively. The upper portion of the Cooling Lake including the embankment and discharge structure and discharge flume are not safety-related and do not perform an intended function for license renewal. The submerged CSCS pond and intake flume (ultimate heat sink) as well as the CSCS outfall structure which are located within the Cooling Lake are safety-related and are evaluated under separate headings below.

Submerged CSCS Pond and Intake Flume (Ultimate Heat Sink)

The ultimate heat sink (UHS) is the submerged core standby cooling systems (CSCS) pond which includes the intake flume. The CSCS pond and intake flume are excavated from the local soil and is contained within and underlies the Cooling Lake and the natural grade of the site. Failure of the Cooling Lake embankment and internal dikes does not affect any intended function and does not affect the ultimate heat sink. The intake flume and CSCS pond have a combined surface area of 85 acres and depth of 5 feet. The submerged CSCS Pond and intake flume design emergency water level is 690 feet MSL, which is 10 feet below the Cooling Lake normal water level. The intake flume is 2,500 feet long. The upper flume walls are protected against wave action by riprap placed over crushed stone. At the Lake Screen House, the sides of the flume are formed by a concrete retaining wall on the south and a sheet pile retaining wall on the north. The concrete retaining wall and the sheet pile retaining wall are evaluated with the Lake Screen House. A nonsafety-related shad net is installed across the end of the intake flume at the Cooling Lake. The purpose of the CSCS pond and intake flume are to provide the ultimate heat sink by providing water for the Essential Cooling Water System and also to provide water for the Fire Protection System. The ultimate heat sink (UHS) provides sufficient cooling water to permit the safe shutdown and cool down of the station for 30 days with no makeup for both normal and accident conditions, and also provides water for fire protection equipment. The submerged CSCS pond and intake flume are in scope; since they are Seismic Category I, safety-related structures required to maintain structural integrity and an adequate volume of cooling water for safety-related systems during design basis events, and additionally, they provide water for fire protection equipment.

CSCS Outfall Structure

The CSCS outfall structure, also known as the CSCS pipeline outlet chute, the CSCS outlet chute, or the CSCS pond water inlet chute is a safety-related structure consisting of concrete enclosing the ends of the three (3) CSCS return lines which discharge to a reinforced concrete channel or chute which directs return water into the CSCS pond. The CSCS outfall structure is a safety-related structure which directs return flow from CSCS pipelines to the ultimate heat sink and therefore is in scope for license renewal.

Makeup Pipeline Outfall Structure and Makeup and Blowdown Valve House

The makeup pipeline outfall structure, also known as the cooling lake makeup water discharge structure consists of concrete encasing the end of the 60-inch diameter makeup pipeline which discharges to a reinforced concrete channel structure directing makeup water into the Cooling Lake. The purpose of the makeup pipeline outfall structure is to discharge the makeup water from the Illinois River into the lake. The makeup and blowdown valve house contains valves for the subject pipelines, and it is constructed of reinforced concrete below grade and concrete masonry block above grade. The emergency shutdown capability of the plant is not dependent on water input from the main Cooling Lake or makeup pipeline water from the Illinois River. The ultimate heat sink (UHS) provides sufficient cooling water to permit the safe shutdown and cool down of the station for 30 days with no makeup for both normal and accident conditions. The UHS also provides water for fire protection equipment. Therefore, the nonsafety-related Lake Makeup Pipeline Outfall Structure and the Makeup and Blowdown Valve House do not perform an intended function for license renewal and are not in scope.

Service Spillway (or Lake Blowdown Intake Structure) and Blowdown Valve House (Pit)

The service spillway (which is also known as the lake blowdown intake structure) and the blowdown valve house (pit) are constructed of reinforced concrete. The purpose of the service spillway is to direct lake water into the blowdown line for discharge into the Illinois River. The spillway including its gates and valve pit provide for Cooling Lake level control, dilution of wastes and control of the dissolved solids. The blowdown line connects with the lake blowdown outfall structure located on the Illinois River which is evaluated with Miscellaneous Not in Scope Structures. The service spillway and blowdown valve house (pit) are not in scope since they are nonsafety-related and do not perform a license renewal intended function.

Auxiliary Spillway:

The auxiliary spillway is located on northwest corner of the discharge flume (discharge channel). It is constructed of soil and riprap on crushed stone. The purpose of the spillway is to passively drain the Cooling Lake when the water level becomes sufficiently high to prevent overtopping of the exterior dikes. Failure of the exterior dikes or Cooling Lake embankment does not affect an intended function. The nonsafety-related auxiliary spillway does not perform an intended function for license renewal and, therefore it is not in scope.

Included within the boundary of the Cooling Lake and determined to be within the scope of license renewal are reinforced concrete elements, concrete embedments, earthen and riprap elements, shad net anchors, and hatches and plugs which are part of the submerged CSCS pond, intake flume, and the CSCS outfall structure.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Cooling Lake structure.

Included in the boundary of the Cooling Lake and determined to be not in scope for license renewal are the auxiliary spillway, cooling lake embankment (including discharge structure and discharge flume), makeup pipeline outfall structure, service spillway, and lake blowdown valve pit. These structures are nonsafety-related and are designed to provide and maintain a volume of water for nonsafety-related cooling purposes, level control, waste dilution or to protect the Cooling Lake embankment (dikes). They are not necessary for the function of the UHS, fire protection, or to provide flood protection for LSCS plant. Additionally, there are other features in the immediate vicinity of the Cooling Lake which are associated with access to the Lake, public recreation on the lake, and the fish hatchery. These structural components and features do not perform a license renewal intended function and their failure will not prevent satisfactory accomplishment of a safety-related function.

Not included within the boundary of the Cooling Lake are the Lake Screen House and the retaining walls on the north and south sides of the Lake Screen House which are evaluated separately with the Lake Screen House. Also not included within the boundary of the Cooling Lake are the lake blowdown outfall structure and associated valve pit, and the river screen house which are evaluated with Miscellaneous Not in Scope Structures. The shad net (cable, polymer and steel components) are included within the Essential Cooling Water System the shad net anchors are within scope of the Cooling Lake.

For more detailed information, see UFSAR Sections 2.4, 2.5, Table 3.2-1, 9.2, 10.4, and 11.2.

<u>Reason for Scope Determination</u>

The Cooling Lake meets 10 CFR 54.4(a)(1) because it is a safety-related structure that is relied upon to remain functional during and following design basis events. The Cooling Lake meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Cooling Lake also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Station Blackout (10 CFR 50.63). The Cooling Lake is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49) and Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provides physical support, shelter, and protection for safety-related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)

2. Provides Ultimate Heat Sink (UHS) during design basis events. 10 CFR 54.4(a)(1)

3. Provides a source of cooling water for plant safe shutdown. 10 CFR 54.4(a)(1)

4. Provides physical support, shelter, and protection for nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of functions(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

5. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

6. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

2.4
2.4.1.1
2.4.8
2.4.11.6
2.5
2.5.4
2.5.5
2.5.6
Table 3.2-1
9.2
9.2.6
10.4
11.2

License Renewal Boundary Drawings

LR-M-3

Table 2.4-3 Cooling Lake
Components Subject to Aging Management Review

Component Type	Intended Function
Concrete Embedments	Structural Support
Concrete: (CSCS Outfall Structure)	Direct Flow
	Structural Support
Concrete: Shad Net Anchors	Structural Support
Earthen Water-Control Structures (Intake Flume and Submerged CSCS Pond)	Direct Flow
	Water retaining boundary
Hatches/Plugs	Shelter, Protection
	Structural Support

The aging management review results for these components are provided in:

Table 3.5.2-3 Cooling Lake
Summary of Aging Management Evaluation

2.4.4 Diesel Generator Building

Description

The Diesel Generator Building consists of a separate structure for each unit. One is located north of the Auxiliary Building, the other south, both east of the Turbine Building. Each Diesel Generator Building is a multi-level Seismic Category I structure. These structures are part of the power generation complex which includes several contiguous buildings. The shear walls for the Reactor Building, Auxiliary Building, Turbine Building, Radwaste Building, Diesel Generator Buildings, and Off-gas Filter Building are interconnected. These shear walls have been considered to act together to resist lateral loads applied to these buildings. The shear walls for these buildings are Seismic Category I.

The Diesel Generator Buildings are comprised of a multi-level reinforced concrete substructure supported on a reinforced concrete mat foundation on soil with a steel frame above the grade floor. Exterior walls are reinforced concrete. Structural steel columns support the upper elevation slabs. The roof is reinforced concrete with built up roofing. The diesel intakes are provided with a metal enclosure located on the roof. The Diesel Generator Buildings are also designed to withstand tornados, missiles and flooding. Each Diesel Generator Building includes roof extensions for the air intakes, and diesel exhaust penthouses.

The purpose of the Diesel Generator Building is to provide structural support, shelter, access control, and protection to safety-related systems, components and structures housed within it during operation, shutdown, and postulated design basis accidents. Each Diesel Generator Building is divided into separate bays, one for each of the diesel generators provided. Three (3) diesel generator units are located in the Unit 1 Diesel Generator Building, including one (1) diesel generator common to both plant units; and two (2) diesel generators are located in the Unit 2 Diesel Generator Building. Major components contained within the Diesel Generator Building include the emergency diesel generators, fuel oil storage and day tanks, electrical switchgear, HVAC diesel compartment cooling and ventilation equipment, and miscellaneous equipment required to support the operation and maintenance of the emergency diesel generators.

Each diesel generator unit is enclosed in its own reinforced concrete missile protected bay which is designed to provide physical separation for redundant mechanical and electrical safety-related components. Each bay contains a diesel generator, fuel oil day tank, air receivers and compressor and control cabinets. Each bay also contains overhead rigging beams which support maintenance activities. The upper mezzanine portion of each bay contains the air intakes, exhaust, ventilation, and coolant support system. The lower elevations contain the fuel oil storage tanks.

Included in the boundary of the Diesel Generator Building and determined to be in scope for license renewal are concrete anchors, concrete embedments, curbs, equipment supports and foundations, hatches, plugs, masonry walls, metal decking, reinforced concrete elements of the building, steel components, steel elements, and structural bolting.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Diesel Generator Building.

Not included within the boundary of the Diesel Buildings are the cranes and hoists, fire barriers, component supports, and structural commodities. Cranes and hoists are evaluated separately with the Cranes, Hoists and Refueling Equipment System. Fire barriers are evaluated separately with the Fire Protection System. Component supports, including their respective bolting, are evaluated with the Component Supports Commodity Group. The Structural Commodity Group evaluates components such as bird screens; cable trays; compressible joints and seals; conduit; doors; piping and component insulation and insulation jacketing; louvers; miscellaneous structural steel including platforms, stairs, ladders; panels, racks, cabinets, and other enclosures for electrical equipment and instrumentation; penetration seals; penetration sleeves including end caps; roofing; structural sealants, seismic gap seals, gaskets, flashing and other sealants and gap seals; and tube track. In addition, mechanical and electrical systems and components housed in or located within the Diesel Buildings are evaluated with their respective mechanical and electrical license renewal systems or commodities group.

For more detailed information, see UFSAR Sections 1.2.2.2, 3.5.1, 3.5.2, 3.7.1.4, and 3.8.4.1.5.

<u>Reason for Scope Determination</u>

The Diesel Generator Building meets 10 CFR 54.4(a)(1) because it is a safety-related structure that is relied upon to remain functional during and following design basis events. The Diesel Generator Building is not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Diesel Generator Building also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Station Blackout (10 CFR 50.63). The Diesel Generator Building is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49) and Anticipated Transient Without Scram (10 CFR 50.62).

<u>Intended Functions</u>

1. Provides physical support, shelter, and protection for safety-related systems, structures, and components. 10 CFR 54.4(a)(1)

2. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

3. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.2
1.2.4.1
2.5.4.10
3.5.1
3.5.2
3.7.1.4
3.8.4.1.5
3.8.5.1.1
9.5.1
9.5.7.1.1
9.5.8.3
Table 3.2-1
Appendix H - Fire Hazards Analysis

License Renewal Boundary Drawings

LR-M-3

Table 2.4-4 Diesel Generator Building
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: (Exhaust Enclosure) Above-grade exterior	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Interior	Flood Barrier
	Missile Barrier
	Shelter, Protection

Component Type	Intended Function
	Structural Support
Equipment Supports and Foundations	Structural Support
Hatches/Plugs	Missile Barrier
	Shelter, Protection
	Structural Support
Masonry Walls: Above-grade Exterior	Missile Barrier
	Shelter, Protection
	Structural Support
Masonry Walls: Interior	Missile Barrier
	Shelter, Protection
	Structural Support
Metal Decking	Structural Support
Metal Siding	Shelter, Protection
Steel Components: Structural Steel	Structural Support
Steel Elements: Liner, Liner Anchors, Integral Attachments (Sump Liner)	Water Retaining Boundary

The aging management review results for these components are provided in:

Table 3.5.2-4 Diesel Generator Building
Summary of Aging Management Evaluation

2.4.5 Lake Screen House

Description

The Lake Screen House includes the service water tunnel, the two (2) flume retaining walls directly north and south of the building, and the contiguous chemical feed building. The south retaining wall is a reinforced concrete gravity wall. The north retaining wall is steel sheet piling.

The Lake Screen House is a multi-story building. It consists of a reinforced concrete box type structure. A steel frame is constructed using block walls with a precast concrete roof. The structure is located on the west edge of the Cooling Lake. It is located approximately 800 feet, east of the main power block. The Lake Screen House foundation is supported on a 4-foot thick reinforced concrete mat foundation on soil. The Seismic Category I service water tunnel is located in the building.

The Lake Screen House is designed to provide support and protection for the Seismic Category I service water tunnel and the associated safety-related piping and valve components. The Lake Screen House is designed to provide a water retaining boundary and access to the submerged portion of the Core Standby Cooling Systems (CSCS) pond UHS cooling water under postulated environmental and design basis accident loadings. The Lake Screen House is also designed to provide support, shelter and protection of the station fire pumps and other equipment. The building is classified non-Seismic Category I. However, concrete portions of the building are designed to withstand Seismic Category I loads.

Equipment housed within the Lake Screen House includes the service and circulating water pumps, traveling screens, bar racks (trash rack grill), fire protection pumps, the service water tunnel and associated piping. A normally closed bypass line is available to bypass the traveling screens providing lake water directly to the service water tunnel. Buried CSCS piping is connected to the service water tunnel and to safety-related CSCS pumps located within the power block. The bypass line valve is housed in an external concrete valve enclosure which is part of the below grade south exterior wall. The Lake Screen House structure also houses and supports various other nonsafety-related equipment including cranes and hoists, electrical equipment, and panels. A chemical feed system located near the Lake Screen House provides chemical treatment of lake water to control pH, scaling, silting and biological growth.

The chemical feed building is located immediately southwest of the Lake Screen House and includes chemical storage and equipment for water treatment purposes. The chemical feed building is an above grade steel frame and metal siding structure on a concrete mat foundation. The northeast corner of the chemical feed building is in contact with the southwest corner of the Lake Screen House.

Openings are provided in front of the structure to allow lake water to flow into each of the six bays where the nonsafety-related pumps are located. Closure of the stop logs on these openings, and realignment of system valves allows isolation of each of the bays for maintenance and different modes of operation.

The purpose of the Lake Screen House is to provide structural support, shelter, protection, and access to submerged CSCS pond water (UHS) for Seismic Category I safety-related concrete structural components and mechanical components under postulated environmental and design basis accident loading conditions. The Lake Screen House also provides a water retaining boundary for the Cooling Lake. The Lake Screen House also, provides structural support, shelter, protection, and access to Cooling Lake water for non-Seismic Category I plant equipment and components, including fire protection pumps and associated piping, valves and related equipment. The Lake Screen House is therefore in scope for license renewal.

Evaluation of the chemical feed building with the chemical feed pump house determined that it does not perform an intended function delineated in 10 CFR 54.4(a); however a portion of the chemical feed building is in the vicinity of, and in contact with, the Lake Screen House and therefore, the chemical feed building structure is in scope for license renewal. The adjacent chemical feed pump house south of the chemical feed building is not in scope for license renewal.

Included within the boundary of the Lake Screen House which also includes the chemical feed building, and determined to be within the scope of license renewal are reinforced concrete elements (including south flume wall), concrete embedments, concrete anchors, equipment supports and foundations, hatches and plugs, metal decking, masonry walls, steel components (structural steel), steel elements (trash rack bar grill assembly) and piles (sheet piling - north flume wall), precast concrete panels (roof slab), and metal siding. Also included within the boundary is structural bolting associated with specific in scope components evaluated as part of the Lake Screen House and chemical feed building.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Lake Screen House structure.

Included in the boundary for the Lake Screen House structure and determined not to be in scope for license renewal are the active stop logs and valve motor operators which are subject to periodic testing. These components are active, or are provided for maintenance activities. They do not perform a license renewal intended function and their failure does not prevent satisfactory accomplishment of a safety-related function.

Not included in the boundary of the Lake Screen House structure are cranes and hoists, fire barriers, structural commodities, and components supports. Cranes and hoists are evaluated separately with the Cranes, Hoists and Refueling Equipment system, fire barriers are evaluated separately with the Fire Protection System. Component supports, including their respective bolting, are evaluated separately with the Component Supports Commodity Group. Structure commodities are evaluated with the Structures Commodity Group. The Structural Commodity Group evaluates components such as bird screens; cable trays; compressible joints and seals; conduit; doors; piping and component insulation and insulation jacketing; louvers; miscellaneous structural steel including platforms, stairs, ladders; panels, racks, cabinets, and other enclosures for electrical equipment and instrumentation; penetration seals; penetration sleeves including end caps; roofing; structural sealants, gaskets, moisture barriers and water stops, flashing and other sealants and gap seals; and tube track. In addition, mechanical and electrical systems and components housed in or located at the Lake Screen House are evaluated with their respective mechanical and electrical license renewal systems or commodities group. Also not included is the Cooling Lake, which is evaluated separately as the Cooling Lake structure.

For more detailed information, see UFSAR Sections 3.8.4.1, 3.8.4.1.7.2, and 9.2.1.3.

Reason for Scope Determination

The Lake Screen House meets 10 CFR 54.4(a)(1) because portions of the building include a safety-related structure that is relied upon to remain functional during and following design basis events. The Lake Screen House meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the building could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Lake Screen House also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Station Blackout (10 CFR 50.63). The Lake Screen House is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49) and Anticipated Transients Without Scram (10 CFR 50.62).

Intended Functions

1. Provides physical support, shelter, and protection for safety-related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)

2. Provides a source of cooling water for plant safe shutdown. 10 CFR 54.4(a)(1)

3. Provides physical support, shelter, and protection for nonsafety-related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

4. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

5. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.2
2.5.4.10.3
3.8.4.1
3.8.4.1.7.2
3.3.2.3
3.4.1.3
9.2.1.3
9.2.12
Table 3.2-1

License Renewal Boundary Drawings

LR-M-3

Table 2.4-5 Lake Screen House
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete Embedments	Structural Support
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Concrete: Interior	Missile Barrier
	Shelter, Protection
	Structural Support
Equipment Supports and Foundations	Structural Support
Hatches/Plugs	Missile Barrier
	Shelter, Protection
	Structural Support
Masonry Walls: Above-grade Exterior	Shelter, Protection
	Structural Support
Masonry Walls: Interior	Shelter, Protection
	Structural Support
Metal Siding	Shelter, Protection
Piles (Sheet Piling- North Flume Wall)	Flood Barrier
	Structural Support
Precast Panel (Roof Slab)	Shelter, Protection
Steel Components: Structural Steel	Structural Support
Steel Elements (Bar Grill)	Filter

The aging management review results for these components are provided in:

Table 3.5.2-5 Lake Screen House
Summary of Aging Management Evaluation

2.4.6 Offgas Building

Description

The Offgas Building, which is also known as the Off-gas Filter Building, is located east of the Reactor Building. The Offgas Building is part of the power generation complex which includes several contiguous buildings. The shear walls for the Reactor Building, Auxiliary Building, Turbine Building, Radwaste Building, Diesel Generator Buildings, and Offgas Filter Building are interconnected. These shear walls have been considered to act together to resist lateral loads applied to these buildings. Therefore, the shear walls for these buildings are Seismic Category I.

The Offgas Building consists of reinforced concrete structural steel and metal siding with interior, reinforced concrete and concrete block walls. Exterior walls are reinforced concrete and metal siding. The structure is supported by a reinforced concrete mat foundation on soil. The roof is galvanized metal decking with insulation and built-up roofing and a portion of the roof is reinforced concrete. The Offgas Building is also contiguous with the equipment access building which is a part of the Reactor Building. The majority of the south wall of the equipment access building is common with the north wall of the Offgas Building. This common wall is evaluated with the Reactor Building.

The Offgas Building is classified as a Seismic Category II, nonsafety-related structure. However, the Offgas Building foundation shear walls are designed to act together with the other power generation complex shear walls and are Seismic Category I.

The purpose of the Offgas Building is to provide structural support, shelter, and protection for nonsafety-related systems, structures, and components during normal plant operation. The Offgas Building contains the off-gas filters and associated equipment components and the support systems and components necessary to support Fire Protection. The Offgas Building is in the vicinity of the Reactor Building, resists exterior flooding, and the foundation shear walls are Seismic Category I. Therefore, the Offgas Building is in scope of license renewal.

Included in the boundary of the Offgas Building and determined to be within the scope of license renewal are concrete anchors, concrete embedments, equipment supports and foundations, hatches, plugs, masonry walls, metal decking, metal siding, reinforced concrete elements of the building, steel components, steel elements, and structural bolting.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Offgas Building.

Not included within the evaluation boundary of the Offgas Building are the fire barriers, component supports, and structural commodities. Fire barriers are evaluated separately with the Fire Protection System. Component supports, including their respective bolting, are evaluated with the Component Supports Commodity Group. Structural commodities, including their respective bolting, are evaluated with the Structural Commodity Group. The Structural Commodity Group evaluates components such as bird screens; cable trays; compressible joints and seals; conduit; doors; piping and component insulation and insulation jacketing; louvers; miscellaneous structural steel including platforms, stairs, ladders; panels, racks, cabinets, and other enclosures for electrical equipment and instrumentation; penetration seals; penetration sleeves including end caps; roofing; structural sealants, seismic gap seals, gaskets, flashing and other sealants and gap seals; and tube track. In addition, mechanical and electrical systems and components housed in or located within the Offgas Building are evaluated with their respective mechanical and electrical license renewal system or commodity group.

For more detailed information, see UFSAR Sections 1.1 and Table 3.2-1.

Reason for Scope Determination

The Offgas Building is not in scope under 10 CFR 54.4(a)(1) because no portions of the structure are safety-related and relied upon to remain functional during and following design basis events. The Offgas Building meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Offgas Building also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Offgas Building is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provides structural support or restraint to SSCs in the scope of license renewal. 10 CFR 54.4(a)(2)

2. Provides physical support, shelter, and protection for nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

3. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

UFSAR References

1.1
1.2.2.2
Table 3.2-1
3.4.1.3
3.8.4.1.6.3
9.5

License Renewal Boundary Drawings

LR-M-3

Table 2.4-6 <u>Offgas Building</u>
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Flood Barrier
Concrete Embedments	Structural Support
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Support
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Support
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Interior	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Support
Equipment Supports and Foundations	Structural Support
Hatches/Plugs	Shelter, Protection
	Structural Support
Masonry Walls: Interior	Shelter, Protection
	Shielding
	Structural Support
Metal Decking	Shelter, Protection
	Structural Support
Metal Siding	Shelter, Protection
Steel Components: Structural Steel	Structural Support

The aging management review results for these components are provided in:

Table 3.5.2-6 Offgas Building
Summary of Aging Management Evaluation

2.4.7 Primary Containment

Description

The Primary Containment includes the LaSalle County Station Unit 1 and Unit 2 Primary Containment structures, and the containment internal structures. Each Primary Containment is entirely enclosed and contained within the reinforced concrete Reactor Building. The Reactor Building provides secondary containment, and shelter and protection for the Primary Containment and the components housed within.

The Units 1 and 2 Primary Containment(s) are steel lined, post-tensioned, reinforced concrete, Mark II type, seismic category I, and safety-related structures. The Primary Containment is a concrete structure with the exception of the drywell head and access penetrations, which are fabricated from steel. The containment is a BWR (boiling water reactor) Mark II design of over-under pressure suppression configuration with multiple downcomers penetrating a reinforced concrete drywell floor and connecting the reactor drywell to the water pool in the suppression chamber. The Primary Containment consists of a steel dome head and post-tensioned concrete wall standing on a base mat of conventionally reinforced concrete. The inner concrete surface of the drywell is lined with carbon steel plate. The entire suppression chamber is lined with stainless steel including the underside of the drywell floor. The drywell and suppression chamber are connected four vacuum relief valves which are outside of the Primary Containment and form an extension of the containment pressure boundary.

The purpose of the Primary Containment is to provide a high integrity barrier to contain the effects of the postulated design basis line break and direct the steam released to the suppression chamber pool. The suppression chamber provides a reservoir of water capable of condensing steam flow from the drywell. It also provides a source of water for the ECCS (emergency core cooling system) and for pressure suppression in the event of a loss-of-coolant accident. The Primary Containment and internal structures provide structural support to safety and nonsafety-related systems, structures, and components housed within the Primary Containment. The steel lined concrete drywell and suppression chamber walls provide a structural pressure barrier, water retaining boundary, radiation shielding, and structural support for floors in the reactor building including the refueling floor and pools.

Major systems and components in the Primary Containment include the reactor vessel and associated auxiliary systems, vent pipe system (downcomers) connecting the drywell and wetwell, containment cooling system, and the main steam safety relief valve (MSRV) discharge piping with associated quencher components.

The Primary Containment consists of the following major structural components:

- Primary Containment wall - The Primary Containment wall is constructed of post-tensioned and reinforced concrete approximately 6 foot thick for the drywell wall and 4 foot thick for the suppression pool wall. The drywell wall is lined with a carbon steel plate on the inside surface. The suppression pool walls are lined with stainless steel. The Primary Containment wall is reinforced with conventional reinforcing steel and with vertical and horizontal tendons. The unbounded tendons are protected by a corrosion protection medium. The Reactor Building floor slabs rest on reinforced concrete corbels that are a part of the Primary Containment wall.

- Base foundation slab - The containment base foundation slab is approximately 7 foot thick reinforced concrete continuous under both the containment and the reactor building and is founded on soil. The top of the base foundation slab is lined with a stainless steel liner plate that serves as the suppression pool floor.

- Liner plate and anchorages - The carbon steel liner plate in the drywell and the stainless steel liner plate in the suppression pool are ¼-inch thick except for areas thickened for attachments and are anchored to the concrete containment wall by structural steel members welded to the outside of the liner plate and embedded in the concrete. Loads from internal containment attachments are transferred directly into the containment concrete wall by thickening the liner, and by attaching structural weldments or embeds that transfer the load to the concrete.

- Penetrations and access hatches- Services and access between the inside and the outside of the containment are performed through penetrations. Basic penetration types include pipe penetrations, electrical penetrations, and access hatches (equipment hatch, personnel lock, suppression chamber access hatches, and CRD removal hatch). Pipe penetration sleeves are embedded into the concrete. The pipe is welded directly to the head fitting which is welded to the sleeve. Air gaps are provided around the pipes. Pipe penetrations are of welded steel construction without expansion bellows, gaskets, or sealing compounds and are an integral part of the construction. Electrical penetration assemblies are used to extend electrical conductors through the pressure boundary of the Primary Containment. The assembly is sized to be inserted in steel penetration sleeves furnished as part of the containment. Seals are provided between each conductor and the electrical penetration end plate. Access hatches providing access into the Primary Containment are the equipment hatch, personnel lock, suppression chamber access hatches, and the control rod drive removal hatch.

- Drywell Head - The drywell head assembly consists of a steel hemi-ellipsoidal head and a cylindrical lower flange. The head is made of steel plate and is secured with bolts at the mating flange to the ring girder assembly, which is also known as the cone skirt.

- Internal Structures - The internal structures consist of reinforced concrete and structural steel and have the major functions of supporting and shielding the reactor vessel, support recirculation pumps, support piping and auxiliary equipment, and form the pressure-suppression system. These structures include the drywell floor, reactor stabilizer structure (or seismic truss), steam supply system supports, reactor pedestal, reactor shield (wall), platforms and galleries, the suppression chamber columns (concrete columns with an outer lining of stainless steel plate) supporting the diaphragm slab, and downcomers and bracing system.

The drywell floor serves as a pressure barrier between the drywell and suppression chamber, provides lateral support for the reactor pedestal, and provides lateral and vertical support for the downcomers. It is a reinforced concrete circular slab, 3 feet thick. A stainless steel liner plate is provided on underside of the drywell floor. The drywell floor is supported by the reactor pedestal, the containment wall, steel lined reinforced concrete columns. The drywell floor is penetrated by 98 downcomers. The cavity floor which is a reinforced concrete floor slab internal to the reactor pedestal is lined on both the upper and lower sides since it is also the floor of the drywell sump.

The reactor stabilizer structure (also known as the seismic truss) is a steel truss which serves to laterally brace the top of the reactor shield wall to the containment wall.

Reactor steam supply system piping and pumps are supported by various component supports which are supported by the structural steel galleries, or the reactor shield or containment wall. These component supports are evaluated separately with the Component Supports Commodity Group. The reactor stabilizer bracket is included and evaluated with the Primary Containment.

The reactor pedestal is an upright cylindrical reinforced concrete shell that rests on the containment base foundation slab, and supports the drywell floor slab, cavity floor slab, reactor vessel, reactor shield wall, platforms and galleries, downcomer bracing, and piping and equipment supports.

The reactor shield wall is a composite steel and plain concrete open-ended upright cylindrical shell placed around the reactor pressure vessel and supported by the reactor pedestal. The reactor shield functions as a radiation and heat barrier between the RPV and the drywell wall. The reactor shield is also designed as a structural member to support drywell platforms, galleries, equipment and piping-loads as well as to resist pipe rupture, pressure, thermal, and seismic loads. The reactor shield wall is constructed of inner and outer carbon steel plates and un-reinforced concrete between the two (2) plates. The concrete is used for radiation shielding and is not relied upon as a structural element.

The drywell platforms and galleries provide access and support for electrical and mechanical components. The platforms consist of structural steel framing, with steel or aluminum grating and plate. The platforms and galleries consist of structural steel framing supported by the pedestal, containment, and shield walls with steel and aluminum grating. Beams which span between the shield or pedestal and the containment wall are provided with connections at the containment that allow for free thermal expansion.

The suppression chamber columns consist of stainless steel lined reinforced concrete columns which provide support the drywell floor slab.

The stainless steel downcomers which connect the drywell to the pool of water in the suppression chamber are provided with bracing in the suppression chamber.

Other miscellaneous internal structural components include: pipe whip restraints, wetwell platforms, MSRV discharge pipe bracing and support, quencher supports, equipment and piping supports, reactor shield doors and plugs, seals and gaskets, the containment seal plate, drywell sump liner, and the refueling bellows assembly.

Included in the boundary of the Primary Containment are the reinforced concrete components that make up the Primary Containment including the prestressing system components, and internal concrete structures. Steel elements and components in the boundary of the Primary Containment include gallery structural members, pipe whip restraints, reactor shield, reactor stabilizer structure, reactor stabilizer bracket, downcomers and bracing, vacuum relief valves and piping, refueling bellows assembly, seal plate, grating, liner, liner anchors and integral attachments, and the drywell head. Other components included in the boundary of the Primary Containment are bolting (containment closure and structural), Service Level 1 coatings, concrete anchors and embedments, doors (reactor shield doors and plugs), electrical penetration assemblies, hatches and plugs, metal components (including permanent drywell shielding), penetration sleeves and flued head closures, personnel lock, equipment hatch, CRD hatch, and other hatches and closures, jet deflectors, seals and gaskets, and includes internal structures mentioned above.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Primary Containment.

The Primary Containment performs intended functions delineated in 10 CFR 54.4 and is in scope for license renewal in it's entirely.

Not included in the boundary of the Primary Containment are main steam safety relief valves and discharge lines, monorails and hoists, quenchers, drywell and suppression chamber spray headers, ECCS suction strainers, component supports, reactor coolant system and other mechanical systems and components, electrical systems and commodities, fire barriers, and piping and component insulation and structural commodities. Fire barriers are evaluated separately with the Fire Protection System. Component supports, including their respective bolting, are evaluated with the Component Supports Commodity Group. Structural commodities, including their respective bolting, are evaluated with the Structural Commodity Group. The Structural Commodity Group evaluates components such as cable trays; conduit; doors; piping and component insulation and insulation jacketing; louvers; miscellaneous structural steel including platforms, stairs, ladders; panels, racks, cabinets, and other enclosures for electrical equipment and instrumentation; and tube track. In addition, mechanical and electrical systems and components housed in or located within the Primary Containment are evaluated with their respective mechanical and electrical license renewal system or commodity group.

For more detailed information, see UFSAR Sections 3.8.1, and 6.2.1.

<u>Reason for Scope Determination</u>

The Primary Containment meets 10 CFR 54.4(a)(1) because it is a safety-related structure that is relied upon to remain functional during and following design basis events. The Primary Containment meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Primary Containment also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

<u>Intended Functions</u>

1. Provides physical support, shelter, and protection for safety-related systems, structures, and components. 10 CFR 54.4(a)(1)

2. Provide primary containment boundary. 10 CFR 54.4(a)(1)

3. Controls the potential release of fission products to the external environment so that offsite consequences of design basis events are within acceptable limits. 10 CFR 54.4(a)(1)

4. Controls the release of fission products to the secondary containment in the event of a design basis loss-of-coolant accident (LOCA) so that offsite consequences are within

acceptable limits. 10 CFR 54.4(a)(1)

5. Provides sufficient air and water volumes to absorb the energy released to the containment in the event of design basis events so that the pressure is within acceptable limits. 10 CFR 54.4(a)(1)

6. Provides a source of water for emergency core cooling systems. 10 CFR 54.4(a)(1)

7. Provides physical support, shelter, and protection for nonsafety-related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

8. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

9. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

10. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Anticipated Transients Without Scram (10 CFR 50.62). 10 CFR 54.4(a)(3)

11. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

Table 3.6-6
Figure 3.6-27
3.8.1
3.8.2
3.8.3
Table 3.8-1
Figure 3.8-1 through 3.8-38
5.3.3.1.4
Table 6.1-1
6.2.1
Table 6.2-1
E.3
E.4
E.5
E.6
E.7

License Renewal Boundary Drawings

LR-M-3
LR-LAS-M-92, Sheet 2
LR-LAS-M-138, Sheet 2

Table 2.4-7 Primary Containment
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting (Containment Closure)	Structural Pressure Barrier
	Structural Support
Bolting (Structural)	Structural Support
Bolting (Vacuum Relief Line Pipe Flanges)	Structural Pressure Barrier
	Structural Support
Concrete Anchors	Structural Support
Concrete Embedments	Structural Pressure Barrier
	Structural Support
	Water retaining boundary
Concrete: Containment Wall (accessible areas - includes Buttresses)	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Concrete: Containment Wall (inaccessible areas - includes Buttresses)	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Concrete: Foundation, Subfoundation, Basemat (accessible areas - Tendon Access Tunnel Ceiling)	Shelter, Protection
	Structural Pressure Barrier
	Structural Support
Concrete: Foundation, Subfoundation, Basemat (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Pressure Barrier
	Structural Support
Concrete: Interior (Drywell Floor and Cavity Floor)	Direct Flow
	Structural Pressure Barrier
	Structural Support
Concrete: Interior (Pedestal)	Direct Flow
	Structural Pressure Barrier
	Structural Support
Concrete: Interior (Suppression Pool Columns)	Structural Support
Concrete: Reactor Cavity Contiguous Fuel Pool Walls with Tendons	Shielding

Component Type	Intended Function
Concrete: Reactor Cavity Contiguous Fuel Pool Walls with Tendons	Structural Support
Doors (Reactor Shield Wall Doors)	Shielding
	Structural Support
Downcomer Jet Deflectors	Direct Flow
	Shelter, Protection
Electrical Penetration Assemblies (includes Penetration Sleeves and Closure Plates)	Shelter, Protection
	Structural Pressure Barrier
Hatches/Plugs	Missile Barrier
	Shelter, Protection
	Structural Pressure Barrier
Mechanical Penetrations (includes Penetration Sleeves, Flued Heads, and Closure Plates for Pipe and Instrument Penetrations)	Shelter, Protection
	Structural Pressure Barrier
	Structural Support
Metal Components (Permanent Drywell Shielding)	Shielding
	Structural Support
Penetration Sleeves: Drywell Floor (including Closure Rings, Plates, and Caps)	Structural Pressure Barrier
	Structural Support
Personnel Airlock, Equipment Hatch: CRD Hatch	Missile Barrier
	Shelter, Protection
	Structural Pressure Barrier
Personnel Airlock, Equipment Hatch: Locks, Hinges, and Closure Mechanisms	Shelter, Protection
	Structural Pressure Barrier
Pipe Whip Restraints and Jet Impingement Shields	Pipe Whip Restraint
Prestressing System: Anchorage Components	Structural Support
Prestressing System: Grease Cap at Tendon Anchorage	Shelter, Protection
Prestressing System: Tendons	Structural Support
Seals and Gaskets	Structural Pressure Barrier
Service Level I Coatings (Containment Boundary)	Maintain Adhesion
Service Level I Coatings (Internal Structures)	Maintain Adhesion
Sliding Surfaces (Support)	Structural Support

Component Type	Intended Function
Steel Components: (Reactor Shield Wall)	Shelter, Protection
	Shielding
	Structural Support
Steel Components: (Reactor Stabilizer Bracket Assembly)	Structural Support
Steel Components: Reactor Stabilizer Structure (Stabilizer Truss)	Structural Support
Steel Components: Structural Steel	Structural Support
Steel Elements: (Grating)	Structural Support
Steel Elements: (Refueling Bellows Assembly)	Flood Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Steel Elements: Downcomer Bracing (Stiffeners)	Structural Support
Steel Elements: Downcomers	Direct Flow
Steel Elements: Drywell Floor and Cavity Floor Liner, Liner Anchors, Integral Attachments	Direct Flow
	Structural Pressure Barrier
Steel Elements: Drywell Head	Missile Barrier
	Shielding
	Structural Pressure Barrier
Steel Elements: Drywell Liner, Liner Anchors, Integral Attachments (accessible areas)	Structural Pressure Barrier
	Structural Support
Steel Elements: Drywell Liner, Liner Anchors, Integral Attachments (inaccessible areas)	Structural Pressure Barrier
	Structural Support
Steel Elements: Liner for Concrete Columns, Liner Anchors, Integral Attachments	Shelter, Protection
Steel Elements: Liner, Liner Anchors, Integral Attachments (Sump)	Direct Flow
	Water retaining boundary
Steel Elements: Pedestal Liner, Liner Anchors, and Integral Attachments	Direct Flow
	Shelter, Protection
	Structural Pressure Barrier
Steel Elements: Ring Girder Adapter (Unit 1 Vessel Skirt)	Structural Support
Steel Elements: Ring Girder Assembly (includes Cone Skirt)	Flood Barrier

Component Type	Intended Function
Steel Elements: Ring Girder Assembly (includes Cone Skirt)	Structural Pressure Barrier
	Structural Support
	Water retaining boundary
Steel Elements: Seal Plate	Flood Barrier
	Structural Support
	Water retaining boundary
Steel Elements: Suppression Chamber Liner, Liner Anchors, Integral Attachments (accessible areas)	Structural Pressure Barrier
	Structural Support
	Water retaining boundary
Steel Elements: Suppression Chamber Liner, Liner Anchors, Integral Attachments (inaccessible areas)	Structural Pressure Barrier
	Structural Support
	Water retaining boundary
Steel Elements: Vacuum Breaker Valves, Isolation Valves, and Piping	Pressure Relief
	Structural Pressure Barrier
Tunnel (tendon access tunnel walls and floor)	Shelter, Protection

The aging management review results for these components are provided in:

Table 3.5.2-7 Primary Containment
Summary of Aging Management Evaluation

2.4.8 Radwaste Building

Description

The Radwaste Building, which is also called the solid radwaste building, contains both the solid and liquid processing portions of the Radwaste System. The Radwaste Building is a multi-story structure with above and below grade areas. The structure is a part of the power generation complex which includes several contiguous buildings. The Radwaste Building is located west of the Turbine Building. The shear walls for the Reactor Building, Auxiliary Building, Turbine Building, Radwaste Building, Diesel Generator Buildings, and Off-gas Filter Building are interconnected. These shear walls have been considered to act together to resist lateral loads applied to these buildings. Therefore, the shear walls for these buildings are Seismic Category I. The Radwaste Building is designed to preclude accidental release of radioactive materials to the environment. The Radwaste Building does not contain any safety-related equipment.

The Radwaste Building shell is reinforced concrete with the interior walls being made of reinforced concrete and concrete block. The structure is supported on a reinforced concrete mat foundation on soil. The Radwaste Building includes sump(s) to collect waste water, tank rooms with metal liners to retain liquid wastes in event of a spill, a control room, pipe tunnel, truck bay, stainless lined decontamination pit, and a dry waste storage area.

The reinforced concrete walls and floors meet structural, as well as radiation shielding requirements. At certain locations, concrete block masonry walls are used to provide better access for installation and maintenance of equipment.

The purpose of the Radwaste Building is to provide structural support, shelter and protection for nonsafety-related systems, structures, and components that collect, monitor, process, package, and provide temporary storage facilities for radioactive wastes during the operation of the plant. Additionally, the purpose of the Radwaste Building is to prevent liquid radwaste from being released to the environment. The Radwaste Building is classified as a Seismic Category II, nonsafety-related structure. However, the Radwaste Building shear walls are designed to act together with the other power generation complex shear walls and are classified as Seismic Category I, and additionally its walls protect against exterior floods. The Radwaste Building also provides physical support, shelter and protection to portions of the Fire Protection System. The Radwaste Building is therefore in scope for license renewal.

Included in the boundary of the Radwaste Building and determined to be within the scope of license renewal are the reinforced concrete elements, concrete embedments, concrete anchors, equipment supports and foundations, hatches and plugs, masonry walls, steel components and steel elements of the radwaste building. Also included within the boundary is structural bolting associated with specific in scope components evaluated as part of the Radwaste Building.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Radwaste Building.

Not included within the boundary of the Radwaste Building are the fire barriers, component supports, and structural commodities. Fire barriers are evaluated separately with the Fire Protection System. Component supports, including their respective bolting, are evaluated with the Component Supports Commodity Group. Structural commodities, including their respective bolting, are evaluated with the Structural Commodity Group. The Structural Commodity Group evaluates components such as bird screens; cable trays; compressible joints and seals; conduit; doors; piping and component insulation and insulation jacketing; louvers; miscellaneous structural steel including platforms, stairs, ladders; panels, racks, cabinets, and other enclosures for electrical equipment and instrumentation; penetration seals; penetration sleeves including end caps; roofing; structural sealants, seismic gap seals, gaskets, flashing and other sealants and gap seals; and tube track. In addition, mechanical and electrical systems and components housed in or located within the Radwaste Building are evaluated with their respective mechanical and electrical license renewal system or commodity group.

For more detailed information, see UFSAR Sections 1.1, 3.1.2.6.2.3, 3.4.1.3, 3.8.4.1.7.1, and Table 3.2-1.

Reason for Scope Determination

The Radwaste Building is not in scope under 10 CFR 54.4(a)(1) because no portions of the structure are safety-related and relied upon to remain functional during and following design basis events. The Radwaste Building meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Radwaste Building also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Radwaste Building is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provides physical support, shelter, and protection for nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

2. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

UFSAR References

1.1
1.2.2.2.i
3.1.2.6.2.3
Table 3.2-1
3.4.1.3
3.8.4.1
3.8.4.1.7.1

3.11.1.2
7.7.11.2.2
9.1.3.1.2
9.4.3.4.2
11.2.1.9.1
11.4.2.7
12.3.1.6.1
12.3.2.4
15.7.3.1
15.7.3.2
Appendix E - Construction Material

License Renewal Boundary Drawings

LR-M-3

Table 2.4-8 Radwaste Building
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier
	Shelter, Protection
	Shielding
	Structural Support
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Shielding
	Structural Support
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Concrete: Interior	Shelter, Protection
	Shielding
	Structural Support
	Water retaining boundary
Equipment Supports and Foundations	Structural Support
Hatches/Plugs	Shelter, Protection
	Shielding
	Structural Support

Component Type	Intended Function
Masonry Walls: Above-grade Exterior	Shelter, Protection
	Shielding
	Structural Support
Masonry Walls: Interior	Shelter, Protection
	Shielding
	Structural Support
Steel Components: Structural Steel	Structural Support
Steel Elements: Liner, Liner Anchors, Integral Attachments (Sump or Pit Liners)	Water Retaining Boundary
Steel Elements: Liner, Liner Anchors, Integral Attachments (Tank Room or Compartment Liner)	Water Retaining Boundary

The aging management review results for these components are provided in:

Table 3.5.2-8 Radwaste Building
Summary of Aging Management Evaluation

2.4.9 Reactor Building

Description

The Reactor Building is a Seismic Category I safety-related structure which includes the equipment access building. Portions of the multi-level structure are constructed above and below grade. The Reactor Building is comprised of an integral structure divided into separate Unit 1 and Unit 2 Reactor Building(s) which share a common foundation, common walls dividing the Unit 1 and Unit 2 portions, common refueling floor area, equipment access building, and a common roof.

The structure is a part of the power generation complex which includes several contiguous buildings. The Reactor Building is located east of the Seismic Class I safety-related Auxiliary Building, and west of the Offgas Building. The Diesel Generator Buildings are located north and south of the Reactor and Auxiliary Buildings. The shear walls for the Reactor Building, Auxiliary Building, Turbine Building, Radwaste Building, Diesel Generator Buildings, and Off-gas Filter Building are interconnected. These shear walls have been considered to act together to resist lateral loads applied to these buildings. Therefore, the shear walls for these buildings are Seismic Category I.

The Reactor Building consists of poured-in-place, reinforced concrete exterior walls up to the refueling floor. Above this level, the building structure is steel frame with insulated metal siding with sealed joints. The Reactor Building is supported on a reinforced concrete mat foundation on soil that is continuous under the Primary Containment structure, Auxiliary Building, Diesel Generator Buildings, and Turbine Buildings. The Reactor Building metal siding is designed to blow-off during tornado winds. The roof consists of galvanized metal decking with built-up roofing. Reactor Building floors are supported by shear walls, containment and pool walls, and by a beam and column framing system. Diagonal flood walls are provided to isolate the residual heat removal and core spray pumps and to prevent other areas of the Reactor Building from being flooded. The exterior walls of the Reactor Building are designed to carry a negative pressure of 0.25 psig and will serve as the containment during shutdown when the primary containment vessel is open for refueling or maintenance. Normal access to the Reactor Building for equipment is through an air lock located in the equipment access building. The refueling pools are located below the operating floor in the Reactor Building and include the spent fuel and dryer-separator pools. The pools are integrally connected to, and supported by, the containment vessel and exterior Reactor Building walls. The inside surfaces of the pools are lined with 1/4-inch thick stainless steel plate which serves as a leakage barrier.

The Reactor Building includes a reinforced concrete main steam chase which connects the primary containment to the main steam tunnel. It protects the main steam line piping from external missiles and protects the other Seismic Category I components in the Reactor Building from the effect of steam in the unlikely event of a pipe rupture inside the chase.

The equipment access building is located at the grade level on the east side of the Reactor Building, north of, and contiguous with, the Offgas Building. It provides controlled access to the Reactor Building for equipment, including a rail car, by means of an air lock equipped with inner bulkhead doors that are flood and missile proof. The air lock, and the equipment access building are an extension of the Reactor Building envelope and are therefore addressed as part of the Reactor Building. The equipment access building is Seismic Category I and consists of reinforced concrete walls and roof. The majority of the south wall of the equipment access building is common with the north wall of the Offgas Building.

At certain locations within the Reactor Building concrete block masonry walls are used to provide better access for erecting and installing equipment. The block walls also meet the structural and radiation shielding requirements.

The Reactor Building completely encloses the Primary Containment. The purpose of the Reactor Building is to provide secondary containment when the Primary Containment is in service and to provide primary containment during reactor refueling and maintenance operations when the Primary Containment is open. The Reactor Building provides structural support, shelter, and protection to systems, structures, and components housed within, during normal plant operation, and during and following postulated design basis accidents and extreme environmental conditions. The Reactor Building is a safety-related Seismic Category I reinforced concrete structure designed to maintain structural integrity during and following postulated design basis accidents and extreme environmental conditions.

The Reactor Building houses refueling and reactor servicing equipment, new and spent fuel storage facilities, and other reactor safety and auxiliary systems.

The Reactor Building is provided with various types of doors which allow personnel and equipment access to and from plant compartments. Personnel access openings into the buildings are provided with an interlocked double door airlock system to minimize Reactor Building air leakage. The doors are addressed with the Structural Commodity Group. Safety-related systems and components are protected against failures of high energy lines by concrete walls. Pipe whip restraints are provided in the primary containment and in the portion of the main steam tunnel located in the auxiliary building and are evaluated with those structures. The ECCS pumps and their associated components are located in individual compartments within a Reactor Building to provide physical separation. Compartment walls may also in some cases provide flood protection and function as missile barriers. Protection against over pressurization of the various essential equipment compartments in the Reactor Building as a result of line breaks is provided by steam venting paths between the various compartments and by blowout panels leading to adjacent spaces or the outside atmosphere.

Included in the boundary of the Reactor Building are bearing pads, blow out panels, bolting, concrete elements of the building, concrete anchors, curbs, concrete embedments, equipment foundations, hatches, plugs, masonry walls, metal decking, metal panels, metal siding, steel components, steel elements including sump liners. Also included in the boundary of the Reactor Buildings are the spent fuel pool liner, spent fuel pool gates, cask loading pit liner, reactor cavity liner, and the steam dryer and moisture separator storage pool liner.

The components in the boundary of the Reactor Building are in the scope of license renewal and subject to aging management review.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Reactor Buildings.

Not included in the boundary of the Reactor Buildings are the Primary Containments and associated refueling bellows and seals, the ventilation systems components, other mechanical and electrical systems and components housed within the building, fire barriers, the refueling platform, new fuel storage racks and spent fuel storage racks, miscellaneous cranes, including reactor building crane and hoists, building elevators, component supports, and piping and component insulation. Mechanical and electrical systems and components housed inside the structure are separately evaluated with their respective mechanical systems, electrical systems, or commodities. Fire barriers are evaluated with the Fire Protection System and the refueling platform, new fuel storage racks, and spent fuel storage racks and the reactor building crane and the miscellaneous cranes and hoists are evaluated with the Cranes, Hoists and Refueling Equipment System. Component supports are evaluated with the Component Supports Commodity Group. Structural commodities, including their respective bolting, are evaluated with the Structural Commodity Group. The Structural Commodity Group evaluates components such as bird screens; cable trays; compressible joints and seals; conduit; doors; piping and component insulation and insulation jacketing; louvers; miscellaneous structural steel including platforms, stairs, ladders; panels, racks, cabinets, and other enclosures for electrical equipment and instrumentation; penetration seals; penetration sleeves including end caps; roofing; structural sealants, seismic gap seals, gaskets, flashing and other sealants and gap seals; and tube track.

For more detailed information, see UFSAR Section 3.8.4.1.1.

Reason for Scope Determination

The Reactor Building meets 10 CFR 54.4(a)(1) because it is a safety-related structure that is relied upon to remain functional during and following design basis events. The Reactor Building meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Reactor Building also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provides physical support, shelter, and protection for safety-related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)

2. Controls the potential release of fission products to the external environment so that offsite consequences of design basis events are within acceptable limits. 10 CFR 54.4(a)(1)

3. Provides protection for safe storage of new and spent fuel. 10 CFR 54.4(a)(1)

4. Provides physical support, shelter, and protection for nonsafety-related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

5. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

6. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

7. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Anticipated Transients Without Scram (10 CFR 50.62). 10 CFR 54.4(a)(3)

8. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

1.1
1.2.2.2
1.2.2.4.2
Figure 2.5-51
3.1.2.2.7
3.1.2.6.2
Table 3.2-1 with note 22 and 34
3.3.2.2.2
3.3.2.3
3.4.2
3.5.2.2
Figure 3.5-3
3.8.4
3.8.4.1.1
3.8.4.1.3
3.8.4.1.6.2
3.8.4.1.6.3
3.8.4.3
3.8.5
3.11.1.1
6.2.3
9.1.2
9.5.1.2.2

<u>License Renewal Boundary Drawings</u>

LR-M-3

Table 2.4-9 **Reactor Building**
Components Subject to Aging Management Review

Component Type	Intended Function
Bearing Pads	Structural Support
Blowout Panels	Pressure Relief
	Shelter, Protection
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Concrete: Below-grade Exterior (accessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Pressure Barrier
	Structural Support
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Pressure Barrier
	Structural Support
Concrete: Interior	Flood Barrier
	HELB/MELB Shielding
	Missile Barrier

Component Type	Intended Function
Concrete: Interior	Shelter, Protection
	Shielding
	Structural Pressure Barrier
	Structural Support
Equipment Supports and Foundations	Structural Support
Hatches/Plugs	Flood Barrier
	HELB/MELB Shielding
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Support
Masonry Walls: Interior	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Support
Metal Decking	Structural Support
Metal Panels (Includes Steel and Lead-Filled Steel Shield Panels)	Shielding
	Structural Support
Metal Siding	Pressure Relief
	Shelter, Protection
	Structural Pressure Barrier
Spent Fuel Pool Gates	Water retaining boundary
Steel Components: Structural Steel	Structural Support
Steel Elements: Fuel Pool Liner, Liner Anchors, and Integral Attachments	Structural Support
	Water retaining boundary
Steel Elements: Plates: includes Checkered Plate Covers	Structural Support
Steel Elements: Reactor Well, Dryer and Separator Pool, and Cask Loading Pit Liner, Liner Anchors, and Integral Attachments	Structural Support
	Water Retaining Boundary
Steel Elements: Sump Liners and Integral Attachments	Water Retaining Boundary

The aging management review results for these components are provided in:

Table 3.5.2-9 Reactor Building
Summary of Aging Management Evaluation

2.4.10 Structural Commodity Group

Description

The Structural Commodity Group shares material and environment properties allowing common programs across all in scope structures to manage their aging effects. Structural Commodities include bird screens; cable trays; compressible joints and seals; conduit; doors; insulation and insulation jacketing; louvers; spray shields; miscellaneous steel (catwalks, stairs, handrails, ladders, platforms, etc.); panels, racks, cabinets, and other enclosures; penetration seals and sleeves; roofing, seals, gaskets, and moisture barriers; tube track; and structural bolting and concrete anchors associated with these commodities. Structural commodities are located in the structures that are within the scope of license renewal.

Bird Screens:

Bird screens within the scope of license renewal include those bird screens attached to stationary louvers that are within the scope of license renewal and perform a license renewal intended function for filtering.

Cable Trays:

Cable trays within the scope of license renewal include cable trays that provide license renewal intended functions of structural support and shelter/protection for various electrical and control system power, control, and instrumentation cables that are within the scope of license renewal.

Compressible Joints and Seals:

Compressible joints and seals within the scope of license renewal include those items that perform a license renewal intended function of shelter/protection or water retaining boundary for structures or structural components which are within the scope of license renewal. This commodity group also includes flexible sections of iso-phase and non-segregated bus ductwork.

Conduit:

Conduit within the scope of license renewal include conduit that provide license renewal intended functions of structural support and shelter/protection for various electrical and control system power, control and instrumentation cables that are within the scope of license renewal.

Doors:

Doors within the scope of license renewal include those doors that perform various license renewal intended functions for shelter/protection, flood barrier, structural pressure barrier, radiation shielding, and HELB shielding for structures which are within the scope of license renewal. Not included in the boundary for this commodity are fire barrier doors that perform an intended function for fire protection and containment airlocks and equipment hatches. Fire barrier doors are identified and evaluated with the license renewal Fire Protection System. Containment airlocks and equipment hatches are identified and evaluated with the license renewal Primary Containment structure.

Insulation and Insulation Jacketing:

Insulation and insulation jacketing within the scope of license renewal includes the insulation and associated jacketing and straps for all insulated piping and components that are within the scope of license renewal.

Metallic insulation consists of stainless steel mirror insulation. Nonmetallic insulation consists of fiberglass, calcium silicate, ceramic or glass fiber, polymers, and foamed plastic.

Metallic insulation jacketing consists of aluminum, and stainless steel held in place by metallic straps, clips or bolts.

The purpose of the insulation is to improve thermal efficiency, minimize heat loads on the HVAC systems, provide for personnel protection, or prevent freezing of heat traced piping and sweating of cold piping and components. The insulation jacketing maintains the integrity of the underlying insulation and prevents water intrusion. Piping and component insulation located inside of structures that are within the scope of license renewal can be required to resist seismic loading conditions and therefore, is within the scope of license renewal since failure of this insulation could impact a function defined for 10 CFR 54.4(a)(1).

Nonsafety-related piping and component insulation located inside structures that are within the scope of license renewal can be required to protect nearby safety-related components from overheating and therefore, is within the scope of license renewal since its failure could impact a function defined for 10 CFR 54.4(a)(2). Nonsafety-related piping and component insulation which performs a function for freeze protection of heat traced piping and components is also within the scope of license renewal under 10 CFR 54.4(a)(2).

Thermal piping and component insulation located inside structures that are not within the scope of license renewal is not within the scope of license renewal since failure of this insulation will not impact intended safety-related functions.

Louvers:

Louvers within scope of license renewal include those louvers that perform a license renewal intended function for shelter and protection and are located in structures that are within the scope of license renewal.

Spray Shields:

Spray Shields within the scope of license renewal, includes metal shielding that performs a license renewal intended function of shelter/protection and is located on components that are within the scope of license renewal and whose failure could impact a function defined for 10 CFR 54.4(a)(1).

Miscellaneous Steel (catwalks, stairs, handrails, ladders, and platforms, etc.):

Miscellaneous steel (catwalks, stairs, handrails ladders, and platforms, etc.) components that perform license renewal intended functions for structural support are located within structures that are in scope of license renewal or whose failure of a miscellaneous steel component during a seismic event could impact a function defined for 10 CFR 54.4(a)(2). Included in this commodity group are the structural bolts associated with these steel structures described previously in this document.

Panels, Racks, Cabinets, and Other Enclosures:

Panels, Racks, Cabinets, and Other Enclosures within the scope of license renewal include those items that perform license renewal intended functions for shelter/protection and structural support for equipment and components within the scope of license renewal.

Penetration Seals:

Penetration Seals within the scope of license renewal include penetrations in walls, floors and ceilings that perform license renewal intended functions for shelter/protection, structural pressure boundary, structural support, flood barrier, radiation shielding, and HELB shielding for structures and components which are within the scope of license renewal. Not included in the boundary for this commodity are Primary Containment penetration seals and fire barrier penetration seals. Primary Containment penetration seals are identified and evaluated with the Primary Containment Structure. Fire barrier penetration seals are identified and evaluated with the license renewal Fire Protection System.

Penetration Sleeves:

Penetration Sleeves within the scope of license renewal include those items that perform license renewal intended functions for structural support, flood barrier, shielding, HELB shielding, pipe whip restraint, structural pressure barrier, and shelter/protection for structures and components which are within the scope of license renewal. Not included in the boundary for this commodity are Primary Containment penetration sleeves and fire barrier penetration sleeves. Primary Containment penetration sleeves are identified and evaluated with the Primary Containment structure. Fire barrier penetration sleeves are identified and evaluated with the Fire Protection System.

Roofing:

Roofing within the scope of license renewal include those roofs that perform license renewal intended functions for shelter/protection for structures which are within the scope of license renewal. The roofing material consists of the roofing outer membrane. Not included in the boundary for this commodity are the structural components that support the roofs. Structural components that support the roofs are identified and evaluated with the associated structures.

Seals, Gaskets, and Moisture Barriers (caulking, flashing, and other sealants):

Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants) within the scope of license renewal include those items that perform license renewal intended functions for shelter/protection, flood barrier, structural pressure barrier, radiation shielding, and HELB shielding for structures and components which are within the scope of license renewal. Not included in the boundary for this commodity are seals, gaskets, and moisture barriers (caulking, flashing, and other sealants) used for Primary Containment pressure boundary integrity and seals, gaskets, and moisture barriers (caulking, flashing, and other sealants) used for fire protection. Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants) used for Primary Containment pressure boundary integrity are identified and evaluated in the Primary Containment Structure. Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants) used for fire protection are identified and evaluated with the license renewal Fire Protection System.

Tube Track:

Tube track within the scope of license renewal includes tube track that performs license renewal intended functions for structural support and shelter/protection for various instrumentation tubing that is within the scope of license renewal.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Structural Commodity Group.

For more detailed information regarding structural commodities see UFSAR Sections 3.4.1.3, 3.4.1, 3.5.2.2, 3.8.4.1.7.2, Table 3.2-1, 5.2.3.1, 5.2.4.2, 5.3.3.1.4, 6.1.1.1, Table 6.1-2, 8.3.1.4.3, 9.4.2.2, and 9.5.8.2.

Reason for Scope Determination

The Structural Commodity Group meets 10 CFR 54.4(a)(1) because it is a safety-related structure that is relied upon to remain functional during and following design basis events. The Structural Commodity Group meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Structural Commodity Group also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63). The Structural Commodity Group is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49).

Intended Functions

1. Provides physical support, shelter, and protection for safety-related systems, structures, and components. 10 CFR 54.4(a)(1)

2. Provides physical support, shelter, and protection for nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

3. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

4. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for Anticipated Transients Without Scram (10 CFR 50.62). 10 CFR 54.4(a)(3)

5. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

3.4.1.3
3.4.1
3.5.2.2
3.8.4.1.7.2
Table 3.2-1
5.2.3.1
5.2.4.2
5.3.3.1.4
6.1.1.1
Table 6.1-2
8.3.1.4.3
9.4.2.2
9.5.8.2

License Renewal Boundary Drawings

LR-M-3

Table 2.4-10 Structural Commodity Group
Components Subject to Aging Management Review

Component Type	Intended Function
Bird Screen	Filter
Bolting (Structural)	Structural Support
Cable Trays	Shelter, Protection
	Structural Support
Compressible Joints and Seals	Shelter, Protection
	Water retaining boundary
Conduit	Shelter, Protection
	Structural Support
Doors	Flood Barrier
	HELB/MELB Shielding
	Shelter, Protection
	Shielding
	Structural Pressure Barrier
Insulation	Thermal Insulation
Insulation Jacketing (includes Clamps, Bands, and Fasteners)	Thermal Insulation Jacket Integrity
Louver	Shelter, Protection
Metal Components (Spray Shields)	Shelter, Protection

Component Type	Intended Function
Miscellaneous Steel (Catwalks, Stairs, Handrails, Ladders, Platforms, etc.)	Structural Support
Panels, Racks, Frames, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration Seals	Flood Barrier
	HELB/MELB Shielding
	Pressure Boundary
	Shelter, Protection
	Shielding
	Structural Support
Penetration Sleeves (includes Sleeve Head Plates)	Flood Barrier
	HELB/MELB Shielding
	Pressure Boundary
	Shelter, Protection
	Shielding
	Structural Support
Roofing	Shelter, Protection
Seals, Gaskets, and Moisture Barriers (Caulking, Flashing and Other Sealants)	Flood Barrier
	HELB/MELB Shielding
	Pressure Boundary
	Shelter, Protection
Tube Track	Shelter, Protection
	Structural Support

The aging management review results for these components are provided in:

Table 3.5.2-10 Structural Commodity Group
Summary of Aging Management Evaluation

2.4.11 Switchyard Structures

Description

The Switchyard Structures include the 345-kV switchyard, the switchyard relay house and the switchyard maintenance building. The Switchyard Structures support connection between the offsite transmission network and the onsite distribution, including unit generators. The 345-kV switchyard is located east-southeast of the power block.

The foundations within the 345-kV switchyard consist of reinforced concrete bearing on soil. The switchyard relay house is a single story masonry wall structure above grade, with reinforced concrete walls below grade supported on a reinforced concrete foundation slab on soil. The roof is comprised of a precast concrete with built-up roofing. The switchyard maintenance building is of similar construction and its foundation is reinforced concrete slab on grade with reinforced concrete footings around the perimeter.

The Switchyard Structures are nonsafety-related. The purpose of the Switchyard Structures is to provide physical support, shelter, and protection for Offsite Power System components, as well as, serving as the electrical transmission terminals for each unit. The Offsite Power System is relied upon to provide offsite power during plant shutdown and in the event of a site emergency. The foundations and supports for four breakers located in the Switchyard Structures are relied on to provide physical support and the switchyard relay house provides physical support and shelter and protection for components relied upon to provide offsite power during station blackout (SBO) and fire safe shutdown and are therefore, in scope for license renewal. The remainder of the Switchyard Structures, including the switchyard maintenance building are not in scope for license renewal.

Included in the boundary of the Switchyard Structures and determined to be within scope of license renewal are structural bolting, concrete, concrete anchors, concrete curbs and concrete embedments, concrete foundations, hatches, plugs, masonry walls, and steel components. Switchyard Structures that provide structural support, shelter, and protection for the Offsite Power System components are in scope for license renewal. Other components and structures including the switchyard maintenance building and the wood lighting poles do not perform an intended function and are therefore, not in the scope of license renewal.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Substation.

Not included in the evaluation boundary of the Switchyard Structures are structural commodities, and component supports other than the substation equipment supports, fire barriers, the transmission and takeoff towers, and components and commodities which are evaluated separately under the respective system or commodity grouping. Other component supports are identified and evaluated separately with the Component Supports Commodity Group. Structural commodities are identified and separately evaluated within the Structural Commodity Group. The fire barriers are evaluated with the Fire Protection System. The transmission and takeoff towers are evaluated within the Yard Structures package. The 138-kV portion of the switchyard is not in scope and only provides power to the not inscope river screen house and the on-the site 12-kV distribution system. Mechanical and electrical systems and components housed or located in the vicinity of the Switchyard Structures are evaluated with their respective mechanical and electrical license renewal system or component groups.

For more detailed information see UFSAR Section 1.2.3.2.1, 8.1.2, 8.2, and 8.3.

Reason for Scope Determination

The Switchyard Structures are not in scope under 10 CFR 54.4(a)(1) because no portions of the structure is safety-related or relied upon to remain functional during and following design basis events. The Switchyard Structures are not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Switchyard Structures meet 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Station Blackout (10 CFR 50.63). The Switchyard Structures is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49) and Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

2. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

1.2.3.2.1
8.1.2
8.2
8.3
Figure 8.1-1
Figure 8.1-2
Figure 8.1-3
Appendix H, Fire Protection Report

License Renewal Boundary Drawings

LR-M-3

Table 2.4-11 Switchyard Structures
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade Exterior (accessible areas)	Structural Support
Concrete: Below-grade Exterior (inaccessible areas)	Shelter, Protection
	Structural Support
Concrete: Foundation, Subfoundation (inaccessible areas)	Structural Support
Concrete: Interior	Shelter, Protection
	Structural Support
Equipment Supports and Foundations	Structural Support
Hatches/Plugs	Shelter, Protection
	Structural Support
Manholes, Handholes, and Duct Banks (Trough)	Shelter, Protection
Masonry Walls: Above-grade Exterior	Shelter, Protection
	Structural Support
Masonry Walls: Interior	Shelter, Protection
	Structural Support
Steel Components: Structural Steel	Structural Support

The aging management review results for these components are provided in:

Table 3.5.2-11 Switchyard Structures
Summary of Aging Management Evaluation

2.4.12 Tank Foundations and Dikes

Description

Tank Foundations and Dikes consist of the cycled condensate storage tank foundations and dikes, clean condensate tank foundation, demineralized water tank foundation, well water storage tank foundation, and demineralizer regenerative solution tank foundation.

The Unit 1 and Unit 2 cycled condensate storage tank foundations and dikes are located on the south-west side of the power block. The dike (also known as a berm) for each tank is composed of reinforced concrete with a liner system. The cycled condensate tanks are supported by a circular reinforced concrete ring foundation pad. The remainder of the tank bottom is supported by a layer of clean sand on top of compacted structural backfill. The dike areas also contain galvanized steel valve enclosures which shelter RCIC valves and piping. The dike was installed for spill mitigation. The dike does not perform an intended function, and therefore is not in scope for license renewal. The Unit 1 and Unit 2 cycled condensate storage tanks are credited to support fire protection (fire safe shutdown), and therefore their foundations perform an intended function and are in scope for license renewal. The tank is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The tanks are evaluated with their respective mechanical system. The steel valve enclosures, contained within the dike area, shelter and protect safety-related and nonsafety-related valves and piping connected to the cycled condensate tanks and is therefore in scope for license renewal.

The well water storage tank for the domestic water system is located south-west of the power block. The tank is supported on a circular concrete ring foundation pad. The remainder of the tank bottom is supported by a layer of clean sand on top of compacted structural backfill. The tank is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The well water storage tank foundation does not perform an intended function and is therefore, not in scope of license renewal.

The demineralizer water storage tank for the domestic water system is located south-west of the power block. The tank is supported on a circular concrete ring foundation pad. The remainder of the tank bottom is supported by a layer of clean sand on top of compacted structural backfill. The tank is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The demineralizer water storage tank foundation does not perform an intended function and is therefore, not in scope of license renewal.

The demineralizer regenerative solution tank is located south-west of the power block and consists of a circular concrete ring foundation pad on grade. The remainder of the tank bottom is supported by a layer of clean sand on top of compacted structural backfill. It is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The demineralizer regenerative storage tank foundation does not perform an intended function and is therefore, not in scope of license renewal.

The clean condensate tank is located south-west of the power block. The tank is supported on a circular concrete ring foundation pad. The remainder of the tank bottom is supported by a layer of clean sand on top of compacted structural backfill. The tank is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The clean condensate tank foundation does not perform an intended function and is therefore, not in scope of license renewal.

The purpose of the Tank Foundation and Dikes is to provide structural support, shelter, and protection for safety-related and nonsafety-related components and commodities including systems and components which support fire safe shutdown. The purpose of the dikes around the Cycled Condensate Tanks is for spill mitigation.

Included in the boundary of the Tank Foundation and Dikes and determined to be in scope are bolting, concrete anchors, concrete elements, and steel elements (valve enclosures) associated with the cycled condensate storage tanks. Other structures and components within the Tank Foundation and Dikes evaluation boundary do not perform a license renewal intended function and are not in scope for license renewal.

Refer to “Components Subject to Aging Management Review” table for a complete list of components included in the boundary of the Tank Foundation and Dikes.

Not included in the boundary of the Tank Foundation and Dikes are component supports, piping and component insulation. Component supports, including their respective bolting, are evaluated with the Component Supports Commodity Group. Other structural commodities, including insulation are evaluated with the Structural Commodity Group. In addition, the tanks and associated mechanical and electrical systems and components located in the vicinity of these tanks are evaluated with their respective mechanical and electrical license renewal system or component groups. Miscellaneous structures are evaluated within the Miscellaneous Not in Scope Structures group.

For more detailed information, see UFSAR Sections 1.2.2.3.10, 3.1.2.4.6, Table 3.2-1, 9.2.7.2, and 9.2.7.3.

Reason for Scope Determination

The Tank Foundations and Dikes is not in scope under 10 CFR 54.4(a)(1) because no portions of the structure are safety-related and relied upon to remain functional during and following design basis events. The Tank Foundations and Dikes is not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Tank Foundations and Dikes also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Tank Foundations and Dikes is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49), Anticipated Transient Without Scram (10 CFR 50.62), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48).

UFSAR References

1.2.2.3.10
3.1.2.4.6
Table 3.2-1
4.6.1.1.2.1
4.6.1.1.2.4.2.1
5.4.6.2.3
5.4.6.3
5.4.6.5
6.1.1.2
9.2.7.2
9.2.7.3

License Renewal Boundary Drawings

LR-M-3

Table 2.4-12 Tank Foundations and Dikes
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting	Structural Support
Concrete Anchors	Structural Support
Concrete: Foundation, Subfoundation (accessible areas - Cycled Condensate Tank Foundation)	Structural Support
Concrete: Foundation, Subfoundation (inaccessible areas - Cycled Condensate Tank Foundation)	Structural Support
Seals, Gaskets, and Moisture Barriers (Caulking, Flashing and Other Sealants)	Shelter, Protection
Steel Elements (Cycled Condensate Tank Valve Enclosures)	Shelter, Protection

The aging management review results for these components are provided in:

Table 3.5.2-12 Tank Foundations and Dikes
Summary of Aging Management Evaluation

2.4.13 Turbine Building

Description

The Turbine Building is divided into two units with a common operating floor. The Turbine Building is a steel framed and reinforced concrete structure enclosed with metal siding above grade. The structure is a part of the power generation complex which includes several contiguous buildings. The Turbine Building is located west of the Auxiliary Building. The shear walls for the Reactor Building, Auxiliary Building, Turbine Building, Radwaste Building, Diesel Generator Buildings, and Off-gas Filter Building are interconnected. These shear walls have been considered to act together to resist lateral loads applied to these buildings. Therefore, the shear walls for these buildings are Seismic Category I.

The Turbine Building is a multi-story structure comprised of a reinforced concrete substructure supported on a reinforced concrete mat foundation on soil with a steel frame above the grade floor. The below grade portion of the Turbine Building includes a pipe tunnel, valve pits, decontamination pits, and sump pits. The exterior walls above grade are insulated metal siding. Structural steel columns support the Turbine Building crane and the roof. The two 210 ton overhead cranes, one for each unit service the turbine-generators. The roof is galvanized metal decking with insulation and built-up roofing. The concrete turbine pedestal foundation is isolated from the turbine building floors above grade. The heater bay area, located on the west side of the Turbine Building, is included within the boundary of the Turbine Building. The heater bay area consists of a monolithic concrete substructure supported on a mat foundation with steel framing above grade. Exterior walls are reinforced concrete. The major portion of the heater bay area roof is poured concrete and the balance consists of galvanized metal decking with insulation and built-up roofing. Structural steel floor framing and grating is provided around the heaters.

The Turbine Building houses the turbine-generators, condensing equipment, moisture separator-reheaters, and feedwater heaters.

The Turbine Building superstructure is designed to withstand the tornado loads on the exposed structural frame so that collapse is prevented. The turbine room siding and roof decking is designed to blow off in an approaching tornado, to ensure venting of the structure. The Turbine Building is classified as a Seismic Category II, nonsafety-related structure. However, the Turbine Building foundation shear walls are designed to act together with the other power generation complex shear walls and are Seismic Category I.

The purpose of the Turbine Building is to provide structural support, shelter, and protection for nonsafety-related systems, structures, and components during normal plant operation and certain safety-related system components during both normal operations and during and following the SSE seismic event. The Turbine Building contains steam and power conversion systems components and the support systems and components necessary to support fire protection, and station blackout.

Included in the boundary of the Turbine Building and determined to be within the scope of license renewal are the blowout panels, concrete anchors, concrete embedments, curbs, equipment supports and foundations, hatches, plugs, masonry walls, metal decking, metal siding, pipe whip restraints, reinforced concrete elements of the building, steel components, steel elements, and structural bolting, The Turbine Building is in scope for license renewal in its entirety except that architectural elements in the miscellaneous operational and maintenance support areas that include furniture, drywall partitions and soffits, storage enclosures and suspended ceilings do not perform an intended function for license renewal and are not in scope.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Turbine Building.

Not included within the evaluation boundary of the Turbine Building are the fire barriers, component supports, and structural commodities. Fire barriers are evaluated separately with the Fire Protection System. Component supports, including their respective bolting, are evaluated with the Component Supports Commodity Group. Structural commodities, including their respective bolting, are evaluated with the Structural Commodity Group. The Structural Commodity Group evaluates components such as bird screens; cable trays; compressible joints and seals; conduit; doors; piping and component insulation and insulation jacketing; louvers; miscellaneous structural steel including platforms, stairs, ladders; panels, racks, cabinets, and other enclosures for electrical equipment and instrumentation; penetration seals; penetration sleeves including end caps; roofing; structural sealants, seismic gap seals, gaskets, flashing and other sealants and gap seals; and tube track. In addition, mechanical and electrical systems and components housed in or located within the Turbine Building are evaluated with their respective mechanical and electrical license renewal system or commodity group.

For more detailed information, see UFSAR Sections 3.3.2.3, 3.4.1.3, 3.4.1.4, and 3.8.5.1.1.

<u>Reason for Scope Determination</u>

The Turbine Building is not in scope under 10 CFR 54.4(a)(1) because no portions of the structure are safety-related and relied upon to remain functional during and following design basis events. The Turbine Building meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Turbine Building also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Turbine Building is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Anticipated Transient Without Scram (10 CFR 50.62).

<u>Intended Functions</u>

1. Provides structural support or restraint to SSCs in the scope of license renewal. 10 CFR 54.4(a)(2)

2. Provides physical support, shelter, and protection for nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

3. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates

compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

4. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

5. Provides physical support, shelter, and protection for systems structures and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

1.1
1.2.2.2.c
2.4.12
Figure 2.5-51
Table 3.2-1
3.3.2.3
3.4.1.3
3.8.5.1.1
7.7.11.2.2
9.4.4.2.f
11.2.1.8
12.3.1.6.1
12.3.2.3
Appendix J; J.4

License Renewal Boundary Drawings

LR-M-3

Table 2.4-13 Turbine Building
Components Subject to Aging Management Review

Component Type	Intended Function
Blowout Panels	Pressure Relief
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Flood Barrier
Concrete Embedments	Structural Support
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support

Component Type	Intended Function
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Interior	Flood Barrier
	Shelter, Protection
	Shielding
	Structural Support
Equipment Supports and Foundations	Structural Support
Hatches/Plugs	Shelter, Protection
	Shielding
	Structural Support
Masonry Walls: Above-grade Exterior	Shelter, Protection
	Shielding
	Structural Support
Masonry Walls: Interior	Shelter, Protection
	Shielding
	Structural Support
Metal Decking	Shelter, Protection
	Structural Support
Metal Siding	Pressure Relief
	Shelter, Protection
Pipe Whip Restraints	Pipe Whip Restraint
Steel Components: Structural Steel	Structural Support
Steel Elements: Liner, Liner Anchors, Integral Attachments (Sump Liner)	Water Retaining Boundary

The aging management review results for these components are provided in:

Table 3.5.2-13 Turbine Building
Summary of Aging Management Evaluation

2.4.14 Yard Structures

Description

Yard Structures include transformer foundations, trenches, light poles, transmission towers, fire hose storage foundations, manholes, valve pits, duct banks, yard drainage, miscellaneous yard structures, and the meteorological tower.

Transformer foundations:

The transformer foundations consist of reinforced concrete slabs which are located north and south of the power block. The transformer foundations are supported by compacted soil fill. The system auxiliary transformers are used to supply safety-related equipment during normal and emergency plant operating conditions, and they provide power to equipment relied upon for post fire safe shutdown and for recovery from station blackout. These transformer foundations are therefore in scope for license renewal.

Manholes, Handholes, Valve Pits and Duct Banks:

Manholes, handholes and valve pits consist of reinforced concrete structures buried underground with a reinforced concrete roof. These structures have a removable opening cover to allow for plant personnel access. Manholes, handholes, and valve pits serve as intermediate access point(s) for electrical, telephone or control cables and lines routed in the yard area and for access to valves for buried piping. The manholes, handholes and valve pits located in the yard area are nonsafety-related. The handholes and valve pits do not perform an intended function and are therefore, not in scope for license renewal. The four electrical manholes that contain power cables for the service water pumps and for the MCC that feeds fire pumps and associated equipment in the Lake Screen House are in scope for license renewal.

Duct banks are comprised of multiple conduits containing electrical cables in an excavated trench in the yard that are encased in concrete and then backfilled with soil. The duct banks are used to route nonsafety-related cables between structures and within the switchyard areas. The duct banks that contain power cables for the service water pumps and for the MCC supplying fire pumps and equipment located in the Lake Screen House are in scope for license renewal.

Light Poles:

Light poles are metal poles that are mounted on concrete foundations located in the yard area. The light poles provide area lighting and are nonsafety-related. Light poles do not perform an intended function and are therefore, not in scope for license renewal.

Transmission Towers:

Transmission towers which include take-off towers, are metal structures supported by reinforced concrete foundations located in the yard. The transmission towers provide support for transmission conductors which connect LSCS to the switchyard and from the switchyard to offsite substations. Transmission towers provide essential power for normal plant, emergency operations, equipment relied upon for post fire safe shutdown, and for recovery from station blackout. The transmission towers and take-off towers associated with the system auxiliary transformers and their foundations are in scope for license renewal.

Fire Hose Storage foundations:

The fire hydrant hose storage foundation pads are reinforced concrete pads on grade and provide level support for the storage of outdoor fire hose and firefighting equipment. These foundations are located around the perimeter of the power block and at various other locations within the yard area. The fire hose storage foundation pads do not perform an intended function and are therefore, not in scope of license renewal.

Site Drainage System:

The site drainage system includes drainage ditches, culverts and storm sewer system consisting of inlets and manholes. The ditches, culverts and storm sewer drainage systems are comprised of buried corrugated metal pipe or reinforced concrete pipe. It also contains at grade reinforced concrete manholes or catch basins and oil interceptor pits and tanks. The storm water inlets are typically covered with grating to allow inflow of storm water. The oil interceptor tanks within the oil interceptor pits are used to separate oily waste from waste water prior to discharge. The underground storm and waste drainage system is not relied upon to prevent flooding at the plant. The site drainage system does not perform an intended function and is therefore, not in scope for license renewal.

Miscellaneous Yard Structures:

Miscellaneous yard structures are comprised of civil features located in the yard area that are not uniquely tied to any structure. These miscellaneous yard structures include roadways, sidewalks, and bollards and may include small storage structures. The miscellaneous yard structures also include the Independent spent fuel storage installation (ISFSI), gas bottle storage facility, hydrogen tank storage area, and miscellaneous small storage structures. These miscellaneous yard structures are nonsafety-related and separated from safety-related systems, structures, and components such that their failure would not impact a safety-related function. These miscellaneous yard structures do not perform an intended function and are therefore, not in scope for license renewal.

The independent spent fuel storage installation (ISFSI) contains the spent fuel storage casks supported on a reinforced concrete pad. The ISFSI is located in the northeast corner of the protected area. The structure is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The ISFSI is separately licensed and is therefore, not in scope for license renewal.

The gas bottle storage facility contains portable gas bottles used at LaSalle in an aboveground segregated walled structure with a steel roof. The gas bottle storage facility is located north of the power block within the protected area. The structure is separated from safety-related systems, structures, and components such that its failure would not impact safety-related function and is therefore, not in scope for license renewal.

The hydrogen storage area consists of concrete pad installed over granular fill supporting the hydrogen tank, nitrogen tanks and tube trailers. The hydrogen storage area is located west of the power block and within the protected area. The structure is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function and is therefore, not in scope for license renewal.

Meteorological Tower:

The meteorological tower includes the adjacent equipment building. The tower is located southwest of the power block and is approximately 400 feet tall. The meteorological tower consists of a guy wire supported steel tower founded on a concrete foundation. The equipment enclosure is a commercial grade metal enclosure on a concrete foundation. The purpose of the meteorological tower is to provide support, shelter, and protection for the meteorological instrumentation which is utilized to obtain data for both Unit 1 and Unit 2. The meteorological tower is nonsafety-related and separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The meteorological tower does not perform an intended function for license renewal and is therefore, not in the scope of license renewal.

The purpose of the Yard Structures is to provide structural support, shelter, and protection for nonsafety-related components and commodities including components which supply power to safety-related equipment during emergency plant operating conditions, and power to equipment relied upon for post fire safe shutdown or recovery from station blackout. The yard drainage system provides for collection and routing of ground water away from the power block.

Included in the boundary of the Yard Structures are trenches, light poles, fire hose house foundations, manholes, handholes valve pits, duct banks, transformer foundations, transmission towers, miscellaneous yard structures, meteorological tower, and the yard drainage system. Included within the boundary of Yard Structures and determined to be in scope are bolting, concrete anchors, electrical manholes and duct banks, concrete foundations (system auxiliary transformer foundations and associated transmission and takeoff tower foundations), and steel components (transmission and takeoff towers). The components included in scope are reinforced concrete foundations, concrete anchor bolts, and tower steel. Other structures and components within the Yard Structures evaluation boundary do not perform a license renewal intended function and are not in scope for license renewal.

Refer to “Components Subject to Aging Management Review” table for a complete list of components included in the boundary of the Yard Structures.

Not included in the boundary of the Yard Structures are component supports, tanks, tank foundations and dikes, piping and component insulation, security structures, fire protection, miscellaneous not in scope structures, buried piping and piping components, switchyard. Component supports, including their respective bolting, are evaluated with the Component Supports Commodity Group. Structural commodities, including their respective bolting, are evaluated with the Structural Commodity Group. In addition, mechanical and electrical systems and components housed in or located in the Yard Facility are evaluated with their respective mechanical and electrical license renewal system or component groups. The tanks and foundations are evaluated within the Tank Foundations and Dikes structure group. Miscellaneous structures are evaluated within the Miscellaneous Not in Scope Structures group. The fire protection components are evaluated separately within the Fire Protection System. Buried piping and piping components in valve pits are evaluated with their respective mechanical systems. The components in the 345-kV switchyard and certain transmission towers are evaluated with the Switchyard Structures license renewal scoping and screening package.

For more detailed information, see UFSAR Sections 1.2.3.6.1, 2.4.2.4, 2.4.4, 3.1.2.6.2.2, Table 3.2-1, 8.2, 9.1.2.3, 9.5.1.2.1, and 9.5.3.2.1.

Reason for Scope Determination

The Yard Structures is not in scope under 10 CFR 54.4(a)(1) because no portions of the structures are safety-related or relied upon to remain functional during and following design basis events. The Yard Structures is not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structure would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Yard Structures also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Station Blackout (10 CFR 50.63). The Yard Structures is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49) and Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

2. Provides physical support, shelter, and protection for systems, structures, and components relied upon in safety analysis or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

1.2.3.6.1
2.4.2.4
2.4.4
3.1.2.6.2.2
Table 3.2-1
8.2
Table 8.3-5
9.1.2.3
9.1.4.2.2
9.5.1.2.1
9.5.3.2.1

License Renewal Boundary Drawings

LR-M-3

Table 2.4-14 **<u>Yard Structures</u>**
Components Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete: Foundation, Subfoundation (accessible areas - Transformers, Transmission and Take Off Towers)	Structural Support
Concrete: Foundation, Subfoundation (inaccessible areas - Transformers, Transmission and Take Off Towers)	Structural Support
Manholes, Handholes, and Duct Banks	Shelter, Protection
	Structural Support
Transmission Towers (includes Take Off Towers)	Structural Support

The aging management review results for these components are provided in:

Table 3.5.2-14 Yard Structures
Summary of Aging Management Evaluation

2.5 SCOPING AND SCREENING RESULTS: ELECTRICAL

The determination of electrical systems that fall within the scope of license renewal is made through the application of the process described in Section 2.1. The results of the electrical systems scoping review are contained in Section 2.2.

Subsection 2.1.6.1 provides the screening methodology for determining which electrical components and commodity groups within the scope of 10 CFR 54.4 meet the requirements contained in 10 CFR 54.21(a)(1). The electrical commodity groups that meet those screening requirements are identified in this section. These identified electrical commodity groups consequently require an aging management review.

As described in Subsection 2.1.6.1, the screening was performed on a commodity group basis for the in scope electrical and I&C systems as well as the electrical and I&C component types associated with in scope mechanical systems listed in Table 2.2-1.

Components which support or interface with electrical and I&C components, for example, cable trays, conduits, instrument racks, panels and enclosures, are assessed as part of the Component Supports Commodity Group in Section 2.4.2.

2.5.1 ELECTRICAL SYSTEMS

The results of the electrical system scoping review are contained in Section 2.2. Additional system details are included in the UFSAR Sections 7 and 8. In addition to the electrical and I&C systems and components, certain switchyard components are credited to restore offsite power following a station blackout (SBO). The boundary for offsite power restoration following an SBO is shown in a simplified diagram in Figure 2.1-2.

2.5.2 ELECTRICAL COMMODITIES

2.5.2.1 Identification of Electrical Commodities

The first step of the screening process for electrical commodities is to use plant documentation to identify the electrical components and commodities within the electrical, I&C and mechanical systems based on plant design documentation, drawings, and the Passport equipment database, as well as by interfacing with the parallel mechanical and civil screening efforts. The electrical components and commodities identified at LSCS are listed below. This list includes electrical components and commodities identified in NEI 95-10 Appendix B in addition to components and commodities added per NUREG-1800 Table 2.1-5.

Electrical Components and Commodities for In Scope Systems:

- Alarm Units
- Analyzers
- Annunciators
- Batteries
- Cable Connections (Metallic Parts)
- Cable Tie Wraps
- Chargers
- Circuit Breakers
- Communication Equipment
- Converters
- Electric Heaters
- Electrical Controls and Panel Internal Assemblies
- Electrical Penetrations
- Elements, RTDs, Sensors, Thermocouples, Transducers
- Fuse Holders
- Fuses
- Generators, Motors
- Heat Trace
- High Voltage Insulators
- Indicators
- Insulated Cables and Connections
- Inverters
- Isolators
- Light Bulbs
- Loop Controllers
- Metal Enclosed Bus
- Meters
- Motor Generator Sets
- Power Supplies
- Radiation Monitors
- Recorders
- Regulators
- Relays
- Signal Conditioners
- Solenoid Operators
- Solid State Devices
- Splices
- Surge Arresters
- Switches
- Switchgear, Load Centers, Motor Control Centers, Distribution Panels
- Switchyard Bus and Connections
- Terminal Blocks
- Transformers
- Transmission Conductors
- Transmission Connectors
- Transmitters
- Uninsulated Ground Conductors

2.5.2.2 Application of Screening Criterion 10 CFR 54.21 (a)(1)(i) to the Electrical Components and Commodities

Following the identification of the electrical components and commodities, the criteria of 10 CFR 54.21 (a)(1)(i) were applied to identify components and commodities that perform their functions without moving parts or without a change in configuration or properties. The following electrical commodities were determined to meet the screening criteria of 10 CFR 54.21 (a)(1)(i):

- Cable Connections (Metallic Parts)
- Cable Tie Wraps
- Electrical Penetrations
- Fuse Holders
- High Voltage Insulators
- Insulated Cables and Connections
- Metal Enclosed Bus
- Splices
- Switchyard Bus and Connections
- Terminal Blocks
- Transmission Conductors
- Transmission Connectors
- Uninsulated Ground Conductors

2.5.2.3 Elimination of Electrical Commodity Groups With No License Renewal Intended Functions

The following electrical commodities were determined to not have a license renewal intended function:

<u>Cable Tie Wraps</u>

Tie wraps are used in cable installations as cable ties. Cable ties hold groups of cables together for restraint and ease of maintenance. Cable ties are used to bundle wires and cables together to keep the wire and cable runs neat and orderly. Cable ties are used to restrain wires and cables within raceways to facilitate cable installation. There are no current license basis requirements for LSCS that cable tie wraps remain functional during and following design basis events. Cable ties are not credited for maintaining cable ampacity, ensuring maintenance of cable minimum bending radius, or maintaining cables within vertical raceways at LSCS. The seismic qualification of cable trays does not credit the use of cable ties. Cable tie wraps are not credited in the LSCS design basis in terms of any 10 CFR 54.4 intended function. Therefore, cable tie wraps are not within the scope of license renewal and therefore, are not subject to aging management review.

<u>Fuse Holders (Not Part of Active Equipment): Metallic Clamps</u>

The fuse holder commodity includes both the insulation portion of the fuse holder and the metallic clamp portion of the fuse holder. The insulation portion of the fuse holders was scoped as part of the insulation material for electrical cables and connections commodity.

The metallic clamp portion of the fuse holders was scoped as a Fuse Holders (Not Part of Active Equipment): Metallic Clamps commodity. A systematic review was performed to determine if there were metallic clamp portions of fuse holders that were in scope for LSCS license renewal. The review used plant documents, controlled drawings, and the plant equipment database to identify individual Fuse Holders (Not Part of Active Equipment): Metallic Clamps. A comprehensive fuse holder list was assembled. A scoping determination was made considering if the fuse holder:

- was installed in active equipment, or
- performed a license renewal intended function.

The review determined that LSCS Fuse Holders (not part of active equipment): Metallic Clamps were either installed in active equipment, or did not perform a license renewal intended function. Therefore, there are no LSCS Fuse Holders (not part of active equipment): Metallic Clamps in scope for LSCS license renewal and therefore, are not subject to aging management review.

Uninsulated Ground Conductors

The uninsulated ground conductor commodity is comprised of grounding cable and associated connectors. Ground conductors are provided for equipment and personnel protection. They do not perform an intended function for license renewal. Therefore, uninsulated ground conductors are not within the scope of license renewal and therefore, are not subject to aging management review.

2.5.2.4 Application of Screening Criteria 10 CFR 54.21 (a)(1)(ii) to Electrical Commodities

The 10 CFR 54.21 (a)(1)(ii) screening criterion was applied to the specific commodities that remained following application of the 10 CFR 54.21 (a)(1)(i) criterion. 10 CFR 54.21 (a)(1)(ii) allows the exclusion of those commodities that are subject to replacement based on a qualified life or specified time period. The only electrical commodities identified for exclusion by the criteria of 10 CFR 54.21 (a)(1)(ii) are electrical and I&C components and commodities included in the Environmental Qualification (EQ) Program. This is because electrical and I&C components and commodities included in the EQ Program have defined qualified lives and are replaced prior to the expiration of their qualified lives. No electrical and I&C components and commodities within the EQ Program are subject to aging management review in accordance with the screening criteria of 10 CFR 54.21 (a)(1)(ii). See Section 4.4 for the TLAA evaluation of the Environmental Qualification (EQ) of Electric Components program. The remaining commodities, all or part of which are not in the EQ Program, require aging management review and are discussed below.

2.5.2.5 Electrical Commodities Subject to Aging Management Review

The electrical commodities subject to aging management review are identified in Table 2.5.2-1, along with the associated intended functions. These electrical commodities are further described below.

2.5.2.5.1 Cable Connections (Metallic Parts)

The Cable Connectors (Metallic Parts) commodity includes metallic portions of cable connections that are not included in the EQ Program. The metallic connections evaluated include splices, threaded connectors, compression type termination lugs, and terminal blocks. Therefore, Cable Connections (Metallic Parts) meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to aging management review.

2.5.2.5.2 Electrical Penetrations

Electrical penetrations at LSCS are environmentally qualified. They are evaluated as a time-limited aging analysis, Section 2.5.2.4, and ultimately managed by the Environmental Qualification (EQ) of Electric Components (B.3.1.3) program. The electrical continuity of electrical penetration pigtails that could potentially be exposed to an adverse localized environment is included in the evaluation for Insulation Material for Electrical Cables and Connections, Section 2.5.2.5.4. The shelter, protection and pressure boundary intended functions of electrical penetrations are included in the evaluation for Primary Containment, Section 2.4.7.

2.5.2.5.3 High Voltage Insulators

The High Voltage Insulators provide physical support for Switchyard Bus, Transmission Conductors, and switchyard active components that are part of the circuits that supply power from the electric utility transmission system to plant buses. These circuits provide power to in scope license renewal components used for recovery from a station blackout event. High Voltage Insulators are not included in the EQ program. Therefore, High Voltage Insulators meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review.

2.5.2.5.4 Insulation Material for Electrical Cables and Connections

The insulated cables and connections commodities are separated for aging management review into subcategories based on their treatment in NUREG-1801:

- Insulation Material for Electrical Cables and Connections
- Insulation Material for Electrical Cables and Connections Used in Instrumentation Circuits
- Conductor Insulation for Inaccessible Power Cables Greater Than or Equal to 400 Volts.

Insulated cables and connections included in this review are:

- Electrical Penetration Pigtails
- Splices
- Terminal Blocks
- Insulating Portions of Fuse Holders.

Numerous insulated cables and connections are included in the EQ Program and, therefore, are not subject to an aging management review in accordance with the screening criteria of 10 CFR 54.21 (a)(1)(ii). Insulated cables and connections not included in the EQ Program meet the criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review.

Insulated cables and connections inside the enclosure of an active device (e.g., motor leads and connections, cables and connections internal to relays, chargers, switchgear, transformers, power supplies) are maintained along with the other subcomponents inside the enclosure and are not subject to an aging management review.

2.5.2.5.5 Metal Enclosed Bus

The metal enclosed buses distribute 4 kV power from the safeguard transformers and the emergency diesel generators to the 4 kV Class 1E switchgear utilizing non-segregated bus work. The metal enclosed buses also provide crossties between units. These portions of the power distribution system are in the scope of license renewal. The metal enclosed buses distribute electrical power to safety-related 4 kV switchgear during recovery from a station blackout event. The metal enclosed buses are not in the EQ Program. Therefore, metal enclosed bus meets the screening criterion of 10 CFR 54.21(a)(1)(ii) and is subject to aging management review.

2.5.2.5.6 Switchyard Bus and Connections, Transmission Conductors, and Transmission Connectors

The Switchyard Bus and Connections are part of the switchyard circuits that supply power from the utility transmission system to plant buses. These circuits provide power to in scope license renewal components used for recovery from a station blackout. The Switchyard Bus and Connections are not included in the EQ program. Therefore, Switchyard Bus and Connections meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review.

The Transmission Conductors and Connectors are part of the switchyard circuits that supply power from the electric transmission system to plant buses. These circuits provide power to in scope license renewal components used for recovery from a station blackout. The Transmission Conductors and Connectors are not included in the EQ program. Therefore, Transmission Conductors and Connectors meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review.

Table 2.5.2-1 Electrical Commodities Subject to Aging Management Review

Commodity	Intended Function
Cable Connections (Metallic Parts)	Electrical Continuity
High Voltage Insulators	Insulate (Electrical)
Insulation Material for Electrical Cables and Connections	Insulate (Electrical)
Metal Enclosed Bus	Electrical Continuity
	Insulate (Electrical)
	Shelter, Protection
Switchyard Bus and Connections, Transmission Conductors, and Transmission Connectors	Electrical Continuity

The aging management review results for these commodities are provided in Table 3.6.2-1 Electrical Commodities – Summary of Aging Management Evaluation.

3.0 AGING MANAGEMENT REVIEW RESULTS

This section provides the results of the aging management review for those structures and components identified in Section 2.0 as being subject to aging management review.

Descriptions of the service environments that were used in the aging management review to determine aging effects requiring management are included in Table 3.0-1, LaSalle Service Environments. The environments used in the aging management reviews are listed in the LaSalle AMR Environment column. The third column identifies one or more of the NUREG-1801 environments that were used when comparing the LaSalle Aging Management Review results to the NUREG-1801 results.

Most of the Aging Management Review (AMR) results information in Section 3 is presented in the following two tables:

- **Table 3.x.1** - where '3' indicates the LRA section number, 'x' indicates the subsection number from NUREG-1800, and '1' indicates that this is the first table type in Section 3. For example, in the Reactor Vessel, Internals, and Reactor Coolant System subsection, this table would be number 3.1.1; in the Engineered Safety Features subsection, this table would be 3.2.1; and so on. For ease of discussion, this table will hereafter be referred to in this Section as "Table 1."

- **Table 3.x.2-y** - where '3' indicates the LRA section number, 'x' indicates the subsection number from NUREG-1800, and '2' indicates that this is the second table type in Section 3; and 'y' indicates the table number for a specific system. For example, for the Reactor Vessel, within the Reactor Vessel, Internals, and Reactor Coolant System subsection, this table would be 3.1.2-2 and for the Reactor Vessel Internals, it would be table 3.1.2-3. For the High Pressure Core Spray System, within the Engineered Safety Features (ESF) subsection, this table would be 3.2.2-1. For the next system within the ESF subsection, it would be table 3.2.2-2. For ease of discussion, this table will hereafter be referred to in this section as "Table 2."

TABLE DESCRIPTION

NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," contains the generic evaluation of existing plant programs. It documents the technical basis for determining where existing programs are adequate without modification, and where existing programs should be augmented for the extended period of operation. The evaluation results documented in NUREG-1801 indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components, within the scope of license renewal, without change. NUREG-1801 also contains recommendations on specific areas for which existing programs should be augmented for license renewal. In order to take full advantage of NUREG-1801, a comparison between the LSCS AMR results and the tables of NUREG-1801 has been performed. The results of that comparison are provided in Table 1 and Table 2.

Table 1

The purpose of Table 1 is to provide a summary comparison of how the facility aligns with the corresponding tables of NUREG-1800. The table is essentially the same as

Tables 3.1-1 through 3.6-1 provided in NUREG-1800, except that the “ID” and “Type” columns have been replaced by an “Item Number” column and the “Rev2 Item” and “Rev1 Item” columns have been replaced by a “Discussion” column.

The “Item Number” column provides the reviewer with a means to cross-reference from Table 2 to Table 1.

The “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, if applicable
- Exceptions to the NUREG-1800 assumptions, if applicable
- A discussion of how the line is consistent with the corresponding line item in NUREG-1800, when that may not be intuitively obvious
- A discussion of how the item is different than the corresponding line item in NUREG-1800 when it may appear to be consistent (e.g., when there is exception taken to an aging management program that is listed in NUREG-1800), if applicable

The format of Table 1 provides the reviewer with a means of aligning a specific Table 1 row with the corresponding NUREG-1800 table row, thereby allowing for the ease of checking consistency.

Table 2

Table 2 provides the detailed results of the aging management reviews for those components identified in LRA Section 2 as being subject to aging management review. There will be a Table 2 for each of the systems within a Chapter 3 Section grouping. For example, for LaSalle, the Engineered Safety Features System Group contains table’s specific to the High Pressure Core Spray (HPCS) System, Low Pressure Core Spray (LPCS) System, Reactor Core Isolation Cooling (RCIC) System, Residual Heat Removal (RHR) System, and Standby Gas Treatment (SGT) System.

Table 2 consists of the following nine columns:

- Component Type
- Intended Function
- Material
- Environment
- Aging Effect Requiring Management
- Aging Management Programs
- NUREG-1801 Item
- Table 1 Item

- Notes

Component Type – The first column identifies all of the component types from Section 2 of the LRA that are subject to aging management review. They are listed in alphabetical order.

Intended Function – The second column contains the license renewal intended functions 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 environments to which the component types are exposed. Service environments are indicated and a list of these environments is provided in Table 3.0-1.

Aging Effect Requiring Management – As part of the aging management review process, the aging effects that are required to be managed in order 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 Programs – The aging management programs used to manage the aging effects requiring management are listed in the sixth column of Table 2. Aging management programs are described in Appendix B.

NUREG-1801 Item – Each combination of component type, material, environment, aging effect requiring management, and aging management program that is listed in Table 2, is compared to NUREG-1801, with consideration given to the standard notes, to identify consistency. Consistency is documented by noting the appropriate NUREG-1801 item number in the seventh column of Table 2. If there is no corresponding item number in NUREG-1801, this field in column seven is left blank. Thus, a reviewer can readily identify the correlation between the plant-specific tables and the NUREG-1801 tables.

Table 1 Item – Each combination of component, material, environment, aging effect requiring management, and aging management program that has an identified NUREG-1801 item number must also have a Table 3.x.1 line item reference number. The corresponding line item from Table 1 is listed in the eighth column of Table 2. If there is no corresponding item in NUREG-1801, this field in column eight is left blank. The Table 1 Item allows correlation of the information from the two tables.

Notes – The notes provided in each Table 2 describe how the information in the table aligns with the information in NUREG-1801. Each Table 2 contains standard lettered notes and, if applicable, plant-specific numbered notes.

The standard lettered notes (e.g., A, B, C) provide standard information regarding comparison of the LaSalle aging management review results with the NUREG-1801 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.

TABLE USAGE

Table 1

The reviewer evaluates each row in Table 1 by moving from left to right across the table. Since the Component, Aging Effect, Aging Management Programs and Further Evaluation Recommended information is taken directly from NUREG-1800, no further analysis of those columns is required. The information intended to help the reviewer the most in this table is contained within the Discussion column. Here the reviewer will be given plant-specific information necessary to determine, in summary, how the LaSalle evaluations and programs align with NUREG-1800. This may be in the form of descriptive information within the Discussion column, or the reviewer may be referred to other locations within the LRA for further information.

Table 2

Table 2 contains all of the Aging Management Review information for the plant, whether or not it aligns with NUREG-1801. For a given row within the table, the reviewer is able to see the intended function, material, environment, aging effect requiring management and aging management program combination for a particular component type within a system. In addition, if there is a correlation between the combination in Table 2 and a combination in NUREG-1801, this will be identified by a referenced item number in column seven, NUREG-1801 Item. The reviewer can refer to the item number in NUREG-1801, if desired, to verify the correlation. If the column is blank, no corresponding combination in NUREG-1801 was found. As the reviewer continues across the table from left to right, within a given row, the next column is labeled Table 1 Item. If there is a reference number in this column, the reviewer is able to use that reference number to locate the corresponding row in Table 1 and see how the aging management program for this particular combination aligns with NUREG-1801.

Table 2 provides the reviewer with a means to navigate from the components subject to Aging Management Review (AMR) in LRA Section 2 all the way through the evaluation of the programs that will be used to manage the effects of aging of those components.

A listing of the acronyms used in this section is provided in Section 1.6.

Cumulative Fatigue Damage and TLAAs in Table 2

A fatigue analysis is considered to be a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3 when it is within the current licensing basis and is based upon transient cycle assumptions associated with 40 years of plant operation. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1).

Table 1 and Table 2 include an entry in the Aging Management Program column indicating "TLAA" for each line item that has a component for which a fatigue TLAA has been identified. See LRA Section 4.3 for details regarding the LSCS fatigue design bases, fatigue TLAAs identified, and TLAA evaluations for the period of extended operation.

Table 3.0-1 – LaSalle Service Environments

LaSalle AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Adverse Localized Environment	The Adverse Localized Environment represents conditions with excessive heat, radiation, moisture, or voltage, sometimes in the presence of oxygen. The effect can be concentrated or applicable to a general plant area.	Adverse localized environment caused by heat, radiation, or moisture Adverse localized environment caused by heat, radiation, oxygen, moisture, or voltage Adverse localized environment caused by significant moisture
Air – Indoor, Controlled	The Air – Indoor, Controlled environment is one in which the specified internal or external surface of the component or structure is exposed to a humidity-controlled (i.e., air conditioned) environment. For electrical purposes, control must be sufficient to eliminate the cited aging effects of contamination and oxidation without affecting the resistance.	Air – indoor, controlled or uncontrolled Air – indoor, controlled or uncontrolled or Air – outdoor
Air – Indoor, Uncontrolled	The Air - Indoor Uncontrolled environment is for indoor locations that are sheltered or protected from weather. It is associated with systems with temperatures higher than the dew point (i.e. condensation can occur, but only rarely); equipment and surfaces are normally dry.	Air Air - indoor, uncontrolled Air – indoor, uncontrolled or Air – outdoor Air – indoor, uncontrolled or Air – outdoor or Ground water/soil System temperature up to 288°C (550°F) Any environment Various

LaSalle AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Air – Outdoor	The Air – Outdoor environment includes atmospheric air with ambient temperatures and a relative humidity up to 100%. This environment may be subject to periodic wetting and wind. The Air-Outdoor (External) environment is considered bounding for situations where piping and components are located in below grade enclosed vaults, tunnels or pits.	Air – outdoor Air – indoor, uncontrolled or Air – outdoor Air – indoor, uncontrolled or Air – outdoor or Ground water/soil Air – indoor, uncontrolled or Air – outdoor or Water – flowing or standing Condensation, air-outdoor Soil or Concrete, or the following external environments: air-outdoor, air-indoor uncontrolled, Any environment Various
Air with Reactor Coolant Leakage	The Air with Reactor Coolant Leakage environment is applicable to closure bolting only which is located in the vicinity of the RPV. The Air with reactor coolant or steam leakage environment is a high temperature leakage environment.	Air with reactor coolant leakage Air Air with steam or water leakage System temperature up to 288^{0}C (550^{0}F)
Air/Gas-Dry	The Air/Gas-Dry environment includes air with a very limited percentage of moisture present that has been treated to reduce the dewpoint well below the system operating temperature. This includes air within air-conditioned spaces and it also includes commercial grade gases (such as nitrogen, freon, etc.) that are provided as a high quality product with little if any external contaminants (bottled gas). This environment does not include air within piping systems downstream of dryers because these dryers require a program to assure they remain functional. For these systems, the Condensation environment is used.	Air – dry Gas

LaSalle AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Closed Cycle Cooling Water	Closed Cycle Cooling Water includes treated water subject to the Closed Treated Water Systems program, which is Aging Management Program XI.M21A in NUREG-1801. The Closed Treated Water Systems program relies on maintenance of system corrosion inhibitor concentrations within specified limits of Electric Power Research Institute TR-107396 and Technical Report 1007820 to minimize corrosion. Demineralized water is treated with corrosion inhibitors, pH control agents, or biocides, as needed.	Closed-cycle cooling water
Closed Cycle Cooling Water >140°F	The Closed Cycle Cooling Water >140°F environment is the same as the Closed Cycle Cooling Water environment, except the Closed Cycle Cooling Water >140°F environment is used for components with an operating temperature >140°F that are constructed of stainless steel.	Closed-cycle cooling water Closed-cycle cooling water >60°C (>140°F)
Concrete	The Concrete environment is one where components are embedded in concrete. This environment is considered aggressive if the concrete pH <11.5 or chlorides concentration >500 ppm.	Concrete Soil or concrete

LaSalle AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Condensation	The Condensation environment is an air environment containing warm or moist air where condensation may occur and periodically wet the component surface. This environment includes air with enough moisture to facilitate loss of material caused by pitting and crevice corrosion for most common materials. Although condensation may occur, it is not expected to be significant enough to result in ponding and pooling that can pose a spatial interaction concern. Ponding and pooling to this degree, as would expected to be found in HVAC drip pans and drains lines, is considered Waste Water. The condensation air environment is used for air drawn inside ventilation systems and air spaces within tanks. Certain components reside inside larger components such that their external surfaces are exposed to the internal environment of the larger component (e.g., tubes in air coolers). For these situations, Condensation is designated as the external environment. The Condensation environment is also used for certain insulated components. Because of air in-leakage through minor gaps in insulation, condensation can occur underneath the insulation on components when the operating temperature of the component is below the dew point of the air on the external surfaces of the insulation.	Condensation Condensation, air-outdoor Moist air or condensation Air-indoor controlled, air-indoor uncontrolled, air-outdoor, moist air, condensation, raw water, treated water Soil or Concrete, or the following external environments: air-outdoor, air-indoor uncontrolled,
Diesel Exhaust	The Diesel Exhaust environment represents the exhaust from diesel engines. It is considered to have the potential to concentrate contaminants and be subject to wetting through condensation.	Diesel Exhaust
Encased in Steel	Concrete encased in steel is protected from environments that promote age-related degradation. Concrete which is totally enclosed and contained within the inner, outer, sleeve, and cover steel plates of the Reactor Shield is an example of where the "encased in steel" environment is applied. The concrete which is encased in steel is protected from other environments that promote age-related degradation.	Environment not addressed in NUREG-1801

LaSalle AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Fuel Oil	The Fuel Oil environment includes fuel oil for the emergency diesel generators, diesel-driven auxiliary feedwater pumps, diesel-driven fire pumps, etc. Water contamination of fuel oil is assumed.	Fuel oil
Groundwater/Soil	The Groundwater/Soil environment is the external environment for structural components buried in the soil where there is groundwater present.	Ground water/soil Air – indoor, uncontrolled or Air – outdoor or Ground water/soil Soil Any environment Various
Lubricating Oil	Lubricating oils are low to medium viscosity hydrocarbons used for bearing, gear, and engine lubrication; also functionally encompasses hydraulic oil (non water based). Water contamination of lubricating oil is assumed.	Lubricating oil
Raw Water	The cooling lake and river water to the cooling lake, as well as ground water from wells, provide the sources of raw water utilized by LSCS. Raw water is also rain or ground water. Raw water is water that has not been demineralized or treated to any significant extent. This can include water for use in open-cycle cooling water and fire protection systems. Potable water, water that is used for drinking or other personal use, is considered raw water. Raw water in plant systems may have been rough filtered to remove large particles and may contain a biocide additive for control of micro- and macro-organisms.	Raw water Raw water, waste water Air-indoor controlled, air-indoor uncontrolled, air-outdoor, moist air, condensation, raw water, treated water Any environment
Reactor Coolant	The Reactor Coolant environment is demineralized water used within the reactor coolant system to transfer heat from the fuel inside the reactor vessel core. The Reactor Coolant environment also includes Steam. The temperature of the Reactor Coolant environment is assumed to be >482 °F. The Reactor Coolant environment has been selected for the following systems for consistency with the NUREG-1801 terminology: Reactor Vessel, Reactor Vessel Internals, and Reactor Coolant Pressure Boundary System.	Reactor coolant Reactor coolant >250°C (>482°F) Reactor coolant >250°C (>482°F) and neutron flux Reactor coolant and neutron flux

LaSalle AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Reactor Coolant and Neutron Flux	The Reactor Coolant and Neutron Flux environment is used for components within the reactor vessel and reactor vessel internals systems that are in contact with reactor coolant and are exposed to neutron fluence projected to exceed 1.0 x 10^{17} n/cm^2 (E >0.1 MeV) within 60 years. The temperature of the Reactor Coolant and Neutron Flux environment is always assumed to be >482°F.	Reactor coolant Reactor coolant >250°C (>482°F) and neutron flux Reactor coolant and neutron flux
Sodium Pentaborate Solution	The Sodium Pentaborate Solution environment is treated water that contains sodium pentaborate. This is confined to the Standby Liquid Control system at LaSalle which is contained within a limited area of the secondary containment.	Sodium Pentaborate solution
Soil	The Soil environment is the external environment for components buried in the soil, and it includes ground water in the soil.	Soil Soil or concrete
Steam	The Steam environment is the internal environment associated with dry steam, such as main steam up to the main turbine. The Water Chemistry Program is used for managing aging effects in dry steam environments, but the One-Time Inspection Program is not required by NUREG-1801. Wet steam environments for LSCS are typically described as either Treated Water or Reactor Coolant, depending upon location, but may use the NUREG-1801 steam environment for cumulative fatigue damage or loss of material aging effects.	Steam Steam or Treated water Reactor coolant
Treated Water	Treated water is demineralized water or chemically purified water and is the base water for all clean systems. Depending on the system, treated water may require further processing. Treated water may be deaerated and include corrosion inhibitors, biocides, or some combination of these treatments. The treated water environment includes all wet steam environments.	Treated water Treated water or Treated borated water Treated water <60C (<140 F) Steam or Treated water Air – indoor, uncontrolled or Treated water Air – indoor, uncontrolled or Air – outdoor[1] Any environment

LaSalle AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Treated Water >140°F	The Treated Water >140°F environment is the same as the Treated Water environment, except the Treated Water >140°F environment is used for systems operating at temperatures >140°F that are constructed of stainless steel. For materials other than stainless steel, the Treated Water environment is used. The Treated Water >140°F environment includes wet steam. Dry steam, such as main steam, is addressed as its own environment.	Treated water >60°C (>140°F) Treated water
Waste Water	Waste Water includes radioactive, potentially radioactive, or non-radioactive waters that are collected from equipment and floor drains, vent system drains, and waters processed by the radwaste system. Waste water may contain contaminants, including oil and boric acid, depending on location, as well as originally treated water that is not monitored by a chemistry program.	Waste water Raw water, Waste water
Water – Flowing	The Water – Flowing environment is water that is refreshed, thus having larger impact on leaching; this can be raw water, groundwater, groundwater intrusion, or flowing water under a foundation.	Water – flowing Water – flowing or standing Air – indoor, uncontrolled or Air – outdoor or Water – flowing or standing Any environment
Water – Standing	The Water – Standing environment is water that is stagnant and unrefreshed, thus possibly resulting in increased ionic strength of solution up to saturation. This can be raw water or groundwater.	Water – flowing or standing Air – indoor, uncontrolled or Air – outdoor or Water – flowing or standing

1. This environmental alignment is only utilized for TLAA related line items. Differences between the NUREG-1801 environment and the LSCS AMR environment do not affect aging management of the cumulative fatigue damage aging effect for the applicable components.

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 Pressure Boundary System (2.3.1.1)
- Reactor Vessel (2.3.1.2)
- Reactor Vessel Internals (2.3.1.3)

3.1.2 RESULTS

The following tables summarize the results of the aging management review for the Reactor Vessel, Internals, and Reactor Coolant System:

Table 3.1.2-1 Reactor Coolant Pressure Boundary System - Summary of Aging Management Evaluation

Table 3.1.2-2 Reactor Vessel - Summary of Aging Management Evaluation

Table 3.1.2-3 Reactor Vessel Internals - Summary of Aging Management Evaluation

3.1.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Management Programs

3.1.2.1.1 Reactor Coolant Pressure Boundary System

Materials

The materials of construction for the Reactor Coolant Pressure Boundary System components are:

- Aluminum Alloy
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Cast Austenitic Stainless Steel (CASS)
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Glass
- Gray Cast Iron

- High Strength Low Alloy Steel Bolting with Yield Strength of 150 ksi or Greater
- Stainless Steel
- Stainless Steel Bolting

Environments

The Reactor Coolant Pressure Boundary System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air with Reactor Coolant Leakage
- Closed Cycle Cooling Water
- Lubricating Oil
- Reactor Coolant
- Steam
- Treated Water
- Treated Water > 140 F
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Reactor Coolant Pressure Boundary System components require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Coolant Pressure Boundary System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)
- BWR Stress Corrosion Cracking (B.2.1.7)
- Bolting Integrity (B.2.1.11)
- Closed Treated Water Systems (B.2.1.13)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)

- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- One-time Inspection of ASME Code Class 1 Small-Bore Piping (B.2.1.23)
- TLAA
- Water Chemistry (B.2.1.2)

3.1.2.1.2 Reactor Vessel

Materials

The materials of construction for the Reactor Vessel components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Carbon or Low Alloy Steel with Nickel Alloy Cladding
- Carbon or Low Alloy Steel with Stainless Steel Cladding
- High Strength Low Alloy Steel Bolting with Yield Strength of 150 ksi or Greater
- Low Alloy Steel
- Nickel Alloy
- Stainless Steel

Environments

The Reactor Vessel components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air with Reactor Coolant Leakage
- Reactor Coolant
- Reactor Coolant and Neutron Flux
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Reactor Vessel components require management:

- Cracking

- Cumulative Fatigue Damage
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Vessel components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)
- BWR Control Rod Drive Return Line Nozzle (B.2.1.6)
- BWR Feedwater Nozzle (B.2.1.5)
- BWR Penetrations (B.2.1.8)
- BWR Stress Corrosion Cracking (B.2.1.7)
- BWR Vessel ID Attachment Welds (B.2.1.4)
- BWR Vessel Internals (B.2.1.9)
- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- One-Time Inspection (B.2.1.21)
- Reactor Head Closure Stud Bolting (B.2.1.3)
- Reactor Vessel Surveillance (B.2.1.20)
- TLAA
- Water Chemistry (B.2.1.2)

3.1.2.1.3 Reactor Vessel Internals

Materials

The materials of construction for the Reactor Vessel Internals components are:

- Cast Austenitic Stainless Steel (CASS)
- Nickel Alloy
- Stainless Steel
- Stainless Steel Bolting
- X-750 alloy

Environments

The Reactor Vessel Internals components are exposed to the following environments:

- Air/Gas - Dry
- Reactor Coolant
- Reactor Coolant and Neutron Flux

Aging Effects Requiring Management

The following aging effects associated with the Reactor Vessel Internals components require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Vessel Internals components:

- BWR Vessel Internals (B.2.1.9)
- TLAA
- Water Chemistry (B.2.1.2)

3.1.2.2 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. For the Reactor Vessel, Internals, and Reactor Coolant System, those programs are addressed in the following subsections.

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). The evaluation of metal fatigue as a TLAA for the Reactor Vessel, Reactor Vessel Internals, and Reactor Coolant Pressure Boundary System 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 upper and lower shell and transition cone exposed to secondary feedwater and steam. The existing program relies on control of water 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 (Appendix A.1 of this SRP-LR).*

Item Number 3.1.1-12 is applicable to PWRs only and is not used for LaSalle.

2. *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. The existing program relies on control of secondary water chemistry to mitigate corrosion. However, some applicants have replaced only the bottom part of their recirculating steam generators, generating a cut in the middle of the transition cone, and, consequently, a new transition cone closure weld. The GALL Report recommends volumetric examinations performed in accordance with the requirements of ASME Code Section XI for upper shell-to and lower shell-to transition cones with gross structural discontinuities for managing loss of material due to general, pitting, and crevice corrosion in the welds for Westinghouse Model 44 and 51 Steam Generators, where a high-stress region exists at the shell to transition cone weld.*

   The new continuous circumferential weld, resulting from cutting the transition cone as discussed above, is a different situation from the SG transition cone *welds containing geometric discontinuities. Control of water chemistry does not preclude loss of material due to pitting and crevice corrosion at locations of stagnant flow conditions. The new transition area weld is a field-weld as opposed to having been made in a controlled manufacturing facility, and the surface conditions of the transition weld may result in flow conditions more conducive to initiation of general, pitting, and crevice corrosion than those of the upper and lower transition cone welds. Crediting of the ISI program for the new SG transition cone weld may not be an effective basis for managing loss of material in this weld, as the ISI criteria would only perform a VT-2 visual leakage examination of the weld as part of the system leakage test performed pursuant to ASME Section XI requirements. In addition, ASME Section XI does not require licensees to remove insulation when performing visual examination on non-borated treated water systems. Therefore, the effectiveness of the chemistry control program should be verified to ensure that loss of material due to general, pitting and crevice corrosion is not occurring.*

For the new continuous circumferential weld, the GALL Report recommends further evaluation to verify the effectiveness of the chemistry control program. A one-time inspection 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. Furthermore, the GALL Report clarifies that this issue is limited to replacement recirculating steam generators with a new transition cone closure weld.

Item Number 3.1.1-12 is applicable to PWRs only and is not used for LaSalle.

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.*

The evaluation of neutron irradiation embrittlement for all ferritic reactor vessel components that have a neutron fluence greater than 1 x 10 ^{17} n/cm^2 (E>1 MeV) at the end of the license renewal term is performed as a TLAA as discussed in Section 4.2.

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. The 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.

The Reactor Vessel Surveillance (B.2.1.20) aging management program will be implemented to manage the loss of fracture toughness of the reactor vessel beltline components and welds exposed to a reactor coolant and neutron flux environment. The program meets the requirements of 10 CFR 50, Appendix H. The program evaluates neutron embrittlement by projecting Upper-Shelf Energy (USE) for reactor materials and impact on Adjusted Reference Temperature for the development of pressure-temperature limit curves. Embrittlement evaluations are performed in accordance with Regulatory Guide 1.99, Rev. 2. The schedule for removing surveillance capsules is in accordance the timetable specified in BWRVIP-86-A for the current license term and in accordance with BWRVIP-116 for the period of extended operation.

3. *Ductility – Reduction in Fracture Toughness is a plant-specific TLAA for Babcock and Wilcox (B&W) reactor internals to be evaluated for the period of extended operation in accordance with the staff's safety evaluation concerning "Demonstration of the Management of Aging Effects for the Reactor Vessel Internals," Babcock and Wilcox Owners Group report number BAW-2248, which is included in BAW-2248A, March 2000. Plant-specific TLAAs are addressed in Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses," of this SRP-LR.*

Item Number 3.1.1-15 is applicable to PWRs only and is not used for LaSalle.

3.1.2.2.4 Cracking due to Stress Corrosion Cracking and Intergranular Stress Corrosion Cracking

1. *Cracking due to stress corrosion cracking (SCC) and intergranular stress corrosion cracking (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 (Appendix A.1 of this SRP-LR).*

Item Number 3.1.1-16 is not used. The top head enclosure vessel flange leak detection line is carbon steel piping and is therefore not susceptible to stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC).

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 to detect cracking. 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 (Appendix A.1 of this SRP-LR).

Item Number 3.1.1-17 is not used since the LaSalle BWR design does not include an isolation condenser.

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 flaw evaluation procedure and criterion in the ASME Section XI Code, 2004 edition[1]. 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 3.1.1-18 is applicable to PWRs only and is not used for LaSalle.

3.1.2.2.6 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 (Appendix A.1 of this SRP-LR).*

Item Number 3.1.1-19 is applicable to PWRs only and is not used for LaSalle.

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 (Appendix A.1 of this SRP-LR).*

Item Number 3.1.1-20 is applicable to PWRs only and is not used for LaSalle.

[1] Refer to the GALL Report, Chapter I, for applicability of other editions of the ASME Code, Section XI.

3.1.2.2.7 Cracking due to Cyclic Loading

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 (Appendix A.1 of this SRP-LR).

Item Number 3.1.1-21 is not used since the LaSalle BWR design does not include an isolation condenser.

3.1.2.2.8 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 (Appendix A.1 of this SRP-LR).

Item Number 3.1.1-22 is applicable to PWRs only and is not used for LaSalle. Loss of material due to erosion for Reactor Vessel, Internals, and Reactor Coolant System is addressed in Item Number 3.1.1-110.

3.1.2.2.9 Cracking due to Stress Corrosion Cracking and Irradiation-Assisted Stress Corrosion Cracking

Cracking due to SCC and irradiation-assisted stress corrosion cracking (IASCC) could occur in inaccessible locations for stainless steel and nickel-alloy Primary and Expansion PWR reactor vessel internal components. If aging effects are identified in accessible locations, the GALL Report recommends further evaluation of the aging effects in inaccessible locations on a plant-specific basis to ensure that this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).

This paragraph for further evaluation from NUREG-1800 was removed by LR-ISG-2011-04.

3.1.2.2.10 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement, Change in Dimension due to Void Swelling, Loss of Preload due to Stress Relaxation, or Loss of Material due to Wear

Loss of fracture toughness due to neutron irradiation embrittlement, change in dimension due to void swelling, loss of preload due to stress relaxation, or loss of material due to wear could occur in inaccessible locations for stainless steel and nickel-alloy Primary and Expansion PWR reactor vessel internal components. If aging effects are identified in accessible locations, the GALL Report recommends *further evaluation of the aging effects in inaccessible locations on a plant-specific basis to ensure that this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).*

This paragraph for further evaluation from NUREG-1800 was removed by LR-ISG-2011-04.

3.1.2.2.11 Cracking due to Primary Water Stress Corrosion Cracking

1. *Foreign operating experience in steam generators with a similar design to that of Westinghouse Model 51 has identified extensive cracking due to primary water stress corrosion cracking (PWSCC) in steam generator (SG) divider plate assemblies fabricated of Alloy 600 and/or the associated Alloy 600 weld materials, even with proper primary water chemistry (EPRI TR-1014982). Cracks have been detected in the stub runner, adjacent to the tubesheet/stub runner weld and with depths of almost a third of the divider plate thickness. Therefore, the water chemistry program may not be effective in managing the aging effect of cracking due to PWSCC in SG divider plate assemblies. This is of particular concern for steam generators where the tube-tubesheet welds are considered structural welds and/or where the divider plate assembly contributes to the mechanical integrity of the tubesheet.*

   Although these SG divider plate cracks may not have a significant safety impact in and of themselves, these cracks could impact adjacent items, such as the tubesheet and the channel head, if they propagate to the boundary with these items. For the tubesheet, PWSCC cracks in the divider plate could propagate to the tubesheet cladding with possible consequences to the integrity of the tube/tubesheet welds. For the channel head, the PWSCC cracks in the divider plate could propagate to the SG triple point and potentially affect the pressure boundary of the SG channel head.

   The existing program relies on control of reactor water chemistry to mitigate cracking due to PWSCC. The GALL Report recommends that a plant-specific AMP be evaluated, along with the primary water chemistry program, because the existing primary water chemistry program may not be capable of mitigating cracking due to PWSCC. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).

Item Number 3.1.1-25 is applicable to PWRs only and is not used for LaSalle.

2. *Cracking due to PWSCC could occur in steam generator nickel alloy tube-to-tubesheet welds exposed to reactor coolant. Unless the NRC has approved a redefinition of the pressure boundary in which the tube-to-tubesheet weld is no longer included, the effectiveness of the primary water chemistry program should be verified to ensure cracking is not occurring:*

   - *For plants with Alloy 600 steam generator tubes that have not been thermally treated and for which an alternate repair criteria such as C*, F* or W* has been permanently approved, the weld is no longer part of the* *pressure boundary and no plant specific aging management program is required;*

- *For plants with Alloy 600 steam generator tubes that have not been thermally treated and for which there is no permanently approved alternate repair criteria such as C*, F* or W*, a plant-specific AMP is required;*
- *For plants with Alloy 600TT steam generator tubes and for which an alternate repair criteria such as H* has been permanently approved, the weld is no longer part of the pressure boundary and no plant specific aging management program is required;*
- *For plants with Alloy 600TT steam generator tubes and for which there is no alternate repair criteria such as H* permanently approved, a plant-specific AMP is required;*
- *For plants with Alloy 690TT steam generator tubes with Alloy 690 tubesheet cladding, the water chemistry is sufficient, and no further action or plant-specific aging management program is required;*
- *For plants with Alloy 690TT steam generator tubes and with Alloy 600 tubesheet cladding, either a plant-specific program or a rationale for why such a program is not needed is required.*

The existing program relies on control of reactor water chemistry to mitigate cracking due to PWSCC. The GALL Report recommends that a plant-specific AMP be evaluated, along with the primary water chemistry program, because the existing primary water chemistry program may not be capable of mitigating cracking due to PWSCC. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).

Item Number 3.1.1-20 is applicable to PWRs only and is not used for LaSalle.

3.1.2.2.12 Cracking due to Fatigue

EPRI 1016596, Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-Rev. 0) identifies cracking due to fatigue as an aging effect that can occur for the lower flange weld in the core support barrel assembly, fuel alignment plate in the upper internals assembly, and core support plate lower support structure in PWR internals designed by Combustion Engineering. The GALL Report recommends that inspection for cracking in this component be performed if acceptable fatigue life cannot be demonstrated by TLAA through the period of extended operation as defined in 10 CFR 54.3.

This paragraph for further evaluation from NUREG-1800 was removed by LR-ISG-2011-04.

3.1.2.2.13 Cracking due to Stress Corrosion Cracking and Fatigue

Cracking due to stress corrosion cracking and fatigue could occur in nickel alloy control rod guide tube assemblies, guide tube support pins exposed to reactor *coolant, and neutron flux. The GALL Report, AMR Item IV.B2.RP-355, recommends further evaluation of a plant-specific AMP to ensure this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).*

This paragraph for further evaluation from NUREG-1800 was removed by LR-ISG-2011-04.

3.1.2.2.14 Loss of Material due to Wear

Loss of material due to wear could occur in nickel alloy control rod guide tube assemblies, guide tube support pins and in Zircaloy-4 incore instrumentation lower thimble tubes exposed to reactor coolant, and neutron flux. The GALL Report, AMR Items IV.B2.RP-356 and IV.B3.RP-357, recommends further evaluation of a plant-specific AMP to ensure this aging effect is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).

This paragraph for further evaluation from NUREG-1800 was removed by LR-ISG-2011-04.

3.1.2.2.15 Quality Assurance for Aging Management of Nonsafety-Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.1.2.2.16 Ongoing Review of Operating Experience

Ongoing review of operating experience is addressed in Appendix A, Section A.1.6 and Appendix B, Section B.1.4.

3.1.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Reactor Vessel, Internals, and Reactor Coolant System components:

- Section 4.2, Reactor Vessel and Internals Neutron Embrittlement Analyses
    - Section 4.2.1, Neutron Fluence Analyses
    - Section 4.2.2, Upper-Shelf Energy Analyses
    - Section 4.2.3, Adjusted Reference Temperature Analyses
    - Section 4.2.4, Pressure – Temperature Limits
    - Section 4.2.5, Axial Weld Failure Probability Assessment Analyses
    - Section 4.2.6, Circumferential Weld Failure Probability Assessment Analyses
    - Section 4.2.7, Reactor Pressure Vessel Reflood Thermal Shock Analyses
    - Section 4.2.8, RPV Core Plate Rim Hold-Down Bolt Loss of Preload Analysis
    - Section 4.2.9, Jet Pump Riser Brace Clamp Loss of Preload Analysis
    - Section 4.2.10, Jet Pump Slip Joint Repair Clamp Loss of Preload Analysis
- Section 4.3, Metal Fatigue Analyses
    - Section 4.3.1, ASME Section III, Class 1 Fatigue Analyses
    - Section 4.3.2, ASME Section III, Class 2 and 3 and ANSI B31.1 Allowable Stress Analyses
    - Section 4.3.3, Environmental Fatigue Analyses for RPV and Class 1 Piping
    - Section 4.3.4, Reactor Vessel Internals Fatigue Analyses
    - Section 4.3.5, High-Energy Line Break (HELB) Analyses Based on Fatigue
- Section 4.7, Other Plant-Specific Analyses
    - Section 4.7.2, Main Steam Line Flow Restrictors Erosion Analysis

3.1.3 CONCLUSION

The Reactor Vessel, Internals, and Reactor Coolant System piping fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Reactor Vessel, Internals, and Reactor Coolant System components are identified in the summaries in Section 3.1.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Reactor Vessel, Internals, and Reactor Coolant System components will be adequately managed so that there is reasonable assurance that the intended functions are maintained consistent with the current licensing basis during 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	High strength, low-alloy steel top head closure stud assembly exposed to air with potential for reactor coolant leakage	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA evaluated for the period of extended operation (See SRP, Sec 4.3 "Metal Fatigue," for acceptable methods to comply with 10 CFR 54.21(c)(1))	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-2	PWR only				
3.1.1-3	Stainless steel or nickel alloy reactor vessel internal components exposed to reactor coolant and neutron flux	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA evaluated for the period of extended operation (See SRP, Sec 4.3 "Metal Fatigue," for acceptable methods to comply with 10 CFR 54.21(c)(1))	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-4	Steel pressure vessel support skirt and attachment welds	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA evaluated for the period of extended operation (See SRP, Sec 4.3 "Metal Fatigue," for acceptable methods to comply with 10 CFR 54.21(c)(1))	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
3.1.1-5	PWR only				
3.1.1-6	Steel (with or without nickel-alloy or stainless steel cladding), or stainless steel; or nickel alloy reactor coolant pressure boundary components: piping, piping components, and piping elements exposed to reactor coolant	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA evaluated for the period of extended operation, and for Class 1 components environmental effects on fatigue are to be addressed. (See SRP, Sec 4.3 “Metal Fatigue,” for acceptable methods to comply with 10 CFR 54.21(c)(1))	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-7	Steel (with or without nickel-alloy or stainless steel cladding), or stainless steel; or nickel alloy reactor vessel components: flanges; nozzles; penetrations; safe ends; thermal sleeves; vessel shells, heads and welds exposed to reactor coolant	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA evaluated for the period of extended operation, and for Class 1 components environmental effects on fatigue are to be addressed. (See SRP, Sec 4.3 “Metal Fatigue,” for acceptable methods to comply with 10 CFR 54.21(c)(1))	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-8	PWR 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
3.1.1-9	PWR only				
3.1.1-10	PWR only				
3.1.1-11	Steel or stainless steel pump and valve closure bolting exposed to high temperatures and thermal cycles	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA evaluated for the period of extended operation; check ASME Code limits for allowable cycles (less than 7000 cycles) of thermal stress range. (SRP Sec 4.3 “Metal Fatigue,” for acceptable methods to comply with 10 CFR 54.21(c)(1))	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-12	PWR only				
3.1.1-13	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds exposed to reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA is to be 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	Consistent with NUREG-1801. TLAA will be used to manage loss of fracture toughness of carbon or low alloy steel with stainless steel cladding reactor vessel shell, nozzles, and welds within the beltline that are exposed to reactor coolant and neutron flux. See subsection 3.1.2.2.3.1.

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
3.1.1-14	Steel (with or without cladding) reactor vessel beltline shell, nozzles, and welds; safety injection nozzles	Loss of fracture toughness due to neutron irradiation embrittlement	Chapter XI.M31, "Reactor Vessel Surveillance"	Yes, plant -specific or integrated surveillance program	Consistent with NUREG-1801. The Reactor Vessel Surveillance (B.2.1.20) program will be used to manage loss of fracture toughness of the carbon or low alloy steel with stainless steel cladding reactor vessel shell, nozzle, and welds within the beltline that are exposed to reactor coolant and neutron flux. See subsection 3.1.2.2.3.2.
3.1.1-15	PWR only				
3.1.1-16	Stainless steel and nickel alloy top head enclosure vessel flange leak detection line	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking	A plant-specific aging management program is to be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC in the vessel flange leak detection line	Yes, plant-specific	Not Applicable. There are no stainless steel or nickel alloy top head enclosure vessel flange leak detection piping components in the Reactor Vessel, Internals, and Reactor Coolant System. The top head enclosure vessel flange leak detection line is carbon steel piping that is not susceptible to stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC). See subsection 3.1.2.2.4.1.

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**
3.1.1-17	Stainless steel isolation condenser components exposed to reactor coolant	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD” for Class 1 components, and Chapter XI.M2, “Water Chemistry” for BWR water, and a plant-specific verification program	Yes, detection of aging effects is to be evaluated	Not Applicable. The LaSalle BWR design does not include an isolation condenser. See subsection 3.1.2.2.4.2.
3.1.1-18	PWR only				
3.1.1-19	PWR only				
3.1.1-20	PWR only				
3.1.1-21	Steel and stainless steel isolation condenser components exposed to reactor coolant	Cracking due to cyclic loading	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD” for Class 1 components The ISI program is to be augmented by a plant-specific verification program	Yes, detection of aging effects is to be evaluated	Not Applicable. The LaSalle BWR design does not include an isolation condenser. See subsection 3.1.2.2.7.

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
3.1.1-22	PWR only				
3.1.1-23	There is no Item Number 3.1.1-23 listed in NUREG-1800 or subsequent ISGs.				
3.1.1-24	There is no Item Number 3.1.1-24 listed in NUREG-1800 or subsequent ISGs.				
3.1.1-25	PWR only				
3.1.1-26	There is no Item Number 3.1.1-26 listed in NUREG-1800 or subsequent ISGs.				
3.1.1-27	There is no Item Number 3.1.1-27 listed in NUREG-1800 or subsequent ISGs.				
3.1.1-28	PWR 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
3.1.1-29	Nickel alloy core shroud and core plate access hole cover (welded covers) exposed to reactor coolant	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and Chapter XI.M2, "Water Chemistry," and for BWRs with a crevice in the access hole covers, augmented inspection using UT or other acceptable techniques	No	The BWR Vessel Internals (B.2.1.9) program has been substituted for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program, and will be used with the Water Chemistry (B.2.1.2) program to manage cracking of the nickel alloy core shroud and core plate access hole cover (welded covers) exposed to reactor coolant and neutron flux in the Reactor Vessel Internals. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.1.1-30	Stainless steel or nickel alloy penetration: drain line exposed to reactor coolant	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking, cyclic loading	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and Chapter XI.M2, "Water Chemistry"	No	Consistent with NUREG-1801 with exceptions. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of stainless steel, nickel alloy, and carbon and low alloy steel with stainless steel or nickel alloy cladding nozzles, penetrations, and vessel shell components exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel. The reactor vessel drain line is carbon steel and is therefore addressed in Item Number 3.1.1-31. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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	Steel and stainless steel isolation condenser components exposed to reactor coolant	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and Chapter XI.M2, "Water Chemistry"	No	The One-Time Inspection (B.2.1.21) program has been substituted for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program, and will be used with the Water Chemistry (B.2.1.2) program to manage loss of material of the carbon steel RPV flange leak detection line, carbon steel Class 1 piping, fittings and branch connections < 4-inch NPS, and carbon steel piping, piping components and piping elements exposed to reactor coolant in the Reactor Coolant Pressure Boundary System. The LaSalle BWR design does not include an isolation condenser. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.1.1-32	PWR only				
3.1.1-33	PWR only				
3.1.1-34	PWR only				
3.1.1-35	PWR 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**
3.1.1-36	PWR only				
3.1.1-37	PWR only				
3.1.1-38	Cast austenitic stainless steel Class 1 pump casings, and valve bodies and bonnets exposed to reactor coolant >250 deg-C (>482 deg-F)	Loss of fracture toughness due to thermal aging embrittlement	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" for Class 1 components. For pump casings and valve bodies, screening for susceptibility to thermal aging is not necessary.	No	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program will be used to manage loss of fracture toughness of the cast austenitic stainless steel Class 1 pump casings and valve bodies and bonnets exposed to reactor coolant >250 deg-C (>482 deg-F) in the Reactor Coolant Pressure Boundary 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
3.1.1-39	Steel, stainless steel, or steel with stainless steel cladding Class 1 piping, fittings and branch connections < NPS 4 exposed to reactor coolant	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking (for stainless steel only), and thermal, mechanical, and vibratory loading	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" for Class 1 components, Chapter XI.M2, "Water Chemistry," and XI.M35, "One-Time Inspection of ASME Code Class 1 Small-bore Piping"	No	Consistent with NUREG-1801 with exceptions. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program, Water Chemistry (B.2.1.2) program, and One-time Inspection of ASME Code Class 1 Small-Bore Piping (B.2.1.23) program will be used to manage cracking of the carbon steel and stainless steel Class 1 piping, fittings, and branch connections < NPS 4 exposed to reactor coolant in the Reactor Coolant Pressure Boundary System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.1.1-40	PWR only				
3.1.1-40x	PWR only				
3.1.1-41	Nickel alloy core shroud and core plate access hole cover (mechanical covers) exposed to reactor coolant	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" for Class 1 components, and Chapter XI.M2, "Water Chemistry"	No	Not Applicable. The core shroud and core plate access hole covers are a welded design and are addressed in Item Number 3.1.1-29.

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
3.1.1-42	PWR only				
3.1.1-43	Stainless steel and nickel-alloy reactor vessel internals exposed to reactor coolant	Loss of material due to pitting and crevice corrosion	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD” for Class 1 components, and Chapter XI.M2, “Water Chemistry”	No	The BWR Vessel Internals (B.2.1.9) program has been substituted for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program, and will be used with the Water Chemistry (B.2.1.2) program to manage loss of material of stainless steel, nickel alloy, and X-750 alloy reactor vessel internals components exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel Internals. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.1.1-44	PWR only				
3.1.1-45	PWR only				
3.1.1-46	PWR only				
3.1.1-47	PWR 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
3.1.1-48	PWR only				
3.1.1-49	PWR only				
3.1.1-50	Cast austenitic stainless steel Class 1 piping, piping component, and piping elements and control rod drive pressure housings exposed to reactor coolant >250 deg-C (>482 deg-F)	Loss of fracture toughness due to thermal aging embrittlement	Chapter XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No	Not Applicable. The LaSalle BWR design does not include cast austenitic stainless steel Class 1 piping, piping components, and piping elements or control rod drive pressure housings exposed to reactor coolant >250 deg-C (>482 deg-F) in Reactor Vessel, Internals, and Reactor Coolant System. The CRD housings and flanges are stainless steel.
3.1.1-51a	PWR only				
3.1.1-51b	PWR only				
3.1.1-52a	PWR only				
3.1.1-52b	PWR 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**
3.1.1-52c	PWR only				
3.1.1-53a	PWR only				
3.1.1-53b	PWR only				
3.1.1-53c	PWR only				
3.1.1-54	PWR only				
3.1.1-55a	PWR only				
3.1.1-55b	PWR only				
3.1.1-55c	PWR only				
3.1.1-56a	PWR 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**
3.1.1-56b	PWR only				
3.1.1-56c	PWR only				
3.1.1-57	There is no Item Number 3.1.1-57 listed in NUREG-1800 or subsequent ISGs.				
3.1.1-58a	PWR only				
3.1.1-58b	PWR only				
3.1.1-59a	PWR only				
3.1.1-59b	PWR only				
3.1.1-59c	PWR 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
3.1.1-60	Steel piping, piping components, and piping elements exposed to reactor coolant	Wall thinning due to flow-accelerated corrosion	Chapter XI.M17, "Flow-Accelerated Corrosion"	No	Consistent with NUREG-1801. The Flow-Accelerated Corrosion (B.2.1.10) program will be used to manage wall thinning of carbon steel piping, piping components, and piping elements exposed to reactor coolant in the Reactor Coolant Pressure Boundary System.
3.1.1-61	PWR only				
3.1.1-62	PWR only				
3.1.1-63	Steel or stainless steel closure bolting exposed to air with reactor coolant leakage	Loss of material due to general (steel only), pitting, and crevice corrosion or wear	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage loss of material of carbon and low alloy steel and high strength low alloy steel closure bolting exposed to air with reactor coolant leakage in the Reactor Vessel and Reactor Coolant Pressure Boundary System.
3.1.1-64	PWR only				
3.1.1-65	PWR 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
3.1.1-66	PWR only				
3.1.1-67	Steel or stainless steel closure bolting exposed to air – indoor with potential for reactor coolant leakage	Loss of preload due to thermal effects, gasket creep, and self-loosening	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage loss of preload of carbon and low alloy steel, high strength low alloy steel, and stainless steel closure bolting exposed to air - indoor uncontrolled and air with the potential for reactor coolant leakage in the Reactor Vessel and Reactor Coolant Pressure Boundary System.
3.1.1-68	PWR only				
3.1.1-69	PWR only				
3.1.1-70	PWR only				
3.1.1-71	PWR only				
3.1.1-72	PWR 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
3.1.1-73	PWR only				
3.1.1-74	PWR only				
3.1.1-75	PWR only				
3.1.1-76	PWR only				
3.1.1-77	PWR only				
3.1.1-78	PWR only				
3.1.1-79	Stainless steel; steel with nickel-alloy or stainless steel cladding; and nickel-alloy reactor coolant pressure boundary components exposed to reactor coolant	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of stainless steel reactor coolant pressure boundary components exposed to reactor coolant in the Reactor Coolant Pressure Boundary System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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
3.1.1-80	PWR only				
3.1.1-81	PWR only				
3.1.1-82	PWR only				
3.1.1-83	PWR only				
3.1.1-84	Steel top head enclosure (without cladding) top head nozzles (vent, top head spray or RCIC, and spare) exposed to reactor coolant	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of carbon steel and low alloy steel top head nozzles and other reactor vessel nozzles, safe ends, and welds exposed to reactor coolant, steam, and reactor coolant and neutron flux in the Reactor Vessel. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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	Stainless steel, nickel-alloy, and steel with nickel-alloy or stainless steel cladding reactor vessel flanges, nozzles, penetrations, safe ends, vessel shells, heads and welds exposed to reactor coolant	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.21) program will be used to manage loss of material of stainless steel, nickel-alloy, and carbon or low alloy steel with stainless steel or nickel cladding reactor vessel flanges, nozzles, penetrations, safe ends, thermal sleeves, internal attachments, vessel shells, heads and welds exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.1.1-86	PWR only				
3.1.1-87	PWR only				
3.1.1-88	PWR only				
3.1.1-89	PWR 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
3.1.1-90	PWR only				
3.1.1-91	High-strength low alloy steel closure head stud assembly exposed to air with potential for reactor coolant leakage	Cracking due to stress corrosion cracking; loss of material due to general, pitting, and crevice corrosion, or wear (BWR)	Chapter XI.M3, "Reactor Head Closure Stud Bolting"	No	Consistent with NUREG-1801 with exceptions. The Reactor Head Closure Stud Bolting (B.2.1.3) program will be used to manage cracking and loss of material of high strength low alloy steel closure head stud bolting assemblies exposed to air with potential for reactor coolant leakage in the Reactor Vessel. Exceptions apply to the NUREG-1801 recommendations for Reactor Head Closure Stud Bolting (B.2.1.3) program implementation.
3.1.1-92	PWR only				
3.1.1-93	PWR 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
3.1.1-94	Stainless steel and nickel alloy vessel shell attachment welds exposed to reactor coolant	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M4, "BWR Vessel ID Attachment Welds," and Chapter XI.M2, "Water Chemistry"	No	Consistent with NUREG-1801 with exceptions. The BWR Vessel ID Attachment Welds (B.2.1.4) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of nickel alloy and stainless steel vessel shell internal attachment welds exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.1.1-95	Steel (with or without stainless steel cladding) feedwater nozzles exposed to reactor coolant	Cracking due to cyclic loading	Chapter XI.M5, "BWR Feedwater Nozzle"	No	Consistent with NUREG-1801. The BWR Feedwater Nozzle (B.2.1.5) program will be used to manage cracking of the low alloy steel feedwater nozzles exposed to reactor coolant in the Reactor Vessel.
3.1.1-96	Steel (with or without stainless steel cladding) control rod drive return line nozzles exposed to reactor coolant	Cracking due to cyclic loading	Chapter XI.M6, "BWR Control Rod Drive Return Line Nozzle"	No	Consistent with NUREG-1801. The BWR Control Rod Drive Return Line Nozzle (B.2.1.6) program will be used to manage cracking of the carbon or low alloy steel with stainless steel cladding control rod drive return line nozzles 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
3.1.1-97	Stainless steel and nickel alloy piping, piping components, and piping elements greater than or equal to 4 NPS; nozzle safe ends and associated welds	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking," and Chapter XI.M2, "Water Chemistry"	No	Consistent with NUREG-1801 with exceptions. The BWR Stress Corrosion Cracking (B.2.1.7) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of stainless steel and nickel alloy piping, piping components, and piping elements, nozzle safe-ends and associated welds greater than or equal to 4-inch NPS that are exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel and Reactor Coolant Pressure Boundary System. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program has been substituted for the BWR Stress Corrosion (B.2.1.7) program and will be used with the Water Chemistry (B.2.1.2) program to manage cracking of stainless steel valve bodies and pump casings in the Reactor Coolant Pressure Boundary System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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
3.1.1-98	Stainless steel or nickel alloy penetrations: instrumentation and standby liquid control exposed to reactor coolant	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking, cyclic loading	Chapter XI.M8, “BWR Penetrations,” and Chapter XI.M2, “Water Chemistry”	No	Consistent with NUREG-1801 with exceptions. The BWR Penetrations (B.2.1.8) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of stainless steel and nickel alloy instrumentation, standby liquid control, and CRD and Incore Monitor vessel penetrations exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.1.1-99	Cast austenitic stainless steel; PH martensitic stainless steel; martensitic stainless steel; X-750 alloy reactor internal components exposed to reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Chapter XI.M9, "BWR Vessel Internals"	No	Consistent with NUREG-1801. The BWR Vessel Internals (B.2.1.9) program will be used to manage loss of fracture toughness of cast austenitic stainless steel and X-750 alloy reactor internal components exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel Internals. PH martensitic stainless steels and martensitic stainless steels are not used within the Reactor Vessel Internals.
3.1.1-100	Stainless steel reactor vessel internals components (jet pump wedge surface) exposed to reactor coolant	Loss of material due to wear	Chapter XI.M9, "BWR Vessel Internals"	No	Consistent with NUREG-1801. The BWR Vessel Internals (B.2.1.9) program will be used to manage loss of material of stainless steel jet pump assembly wedge surfaces exposed to reactor coolant and neutron flux in the Reactor Vessel Internals.

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
3.1.1-101	Stainless steel steam dryers exposed to reactor coolant	Cracking due to flow-induced vibration	Chapter XI.M9, "BWR Vessel Internals" for steam dryer	No	Consistent with NUREG-1801. The BWR Vessel Internals (B.2.1.9) program will be used to manage cracking of stainless steel steam dryers exposed to reactor coolant in the Reactor Vessel Internals.
3.1.1-102	Stainless steel fuel supports and control rod drive assemblies control rod drive housing exposed to reactor coolant	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” and Chapter XI.M2, “Water Chemistry”	No	Consistent with NUREG-1801 with exceptions. The BWR Vessel Internals (B.2.1.9) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of stainless steel fuel supports, control rod drive housings, and steam dryers exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel Internals. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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**
3.1.1-103	Stainless steel and nickel alloy reactor internal components exposed to reactor coolant and neutron flux	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, "BWR Vessel Internals," and Chapter XI.M2, "Water Chemistry"	No	Consistent with NUREG-1801 with exceptions. The BWR Vessel Internals (B.2.1.9) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of stainless steel and nickel alloy reactor internal components and thermal sleeves exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel and Reactor Vessel Internals. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.1.1-104	X-750 alloy reactor vessel internal components exposed to reactor coolant and neutron flux	Cracking due to intergranular stress corrosion cracking	Chapter XI.M9, "BWR Vessel Internals" for core plate, and Chapter XI.M2, "Water Chemistry"	No	Consistent with NUREG-1801 with exceptions. The BWR Vessel Internals (B.2.1.9) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of X-750 alloy reactor internal components exposed to reactor coolant and neutron flux in the Reactor Vessel Internals. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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
3.1.1-105	Steel piping, piping components and piping element exposed to concrete	None	None, provided 1) attributes of the concrete are consistent with ACI 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG-1557, and 2) plant OE indicates no degradation of the concrete	No, if conditions are met.	Not Applicable. There are no steel piping, piping components, and piping elements exposed to concrete in the Reactor Vessel, Internals, and Reactor Coolant System.
3.1.1-106	Nickel alloy piping, piping components and piping element exposed to air – indoor, uncontrolled, or air with borated water leakage	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.1.1-107	Stainless steel piping, piping components and piping element exposed to gas, concrete, air with borated water leakage, air – indoors, uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.1.1-108	There is no Item Number 3.1.1-108 listed in NUREG-1800 or subsequent ISGs.				

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
3.1.1-109	There is no Item Number 3.1.1-109 listed in NUREG-1800 or subsequent ISGs.				
3.1.1-110	Any material, piping, piping components, and piping elements exposed to reactor coolant	Wall thinning due to erosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No	Not Applicable. There are no piping, piping components, and piping elements exposed to reactor coolant that have been identified as susceptible to wall thinning due to erosion in the Reactor Vessel, Internals, and Reactor Coolant System. Piping, piping components, and piping elements in the Reactor Vessel, Internals, and Reactor Coolant System exposed to reactor coolant that are susceptible to wall thinning due to flow-accelerated corrosion are managed by the Flow-Accelerated Corrosion (B.2.1.10) program as described in Item Number 3.1.1-60.

Table 3.1.2-1
Reactor Coolant Pressure Boundary System
Summary of Aging Management Evaluation

Table 3.1.2-1 Reactor Coolant Pressure Boundary System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Accumulator	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	C
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	C
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	IV.C1.RP-44	3.1.1-11	A, 3
				Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-69	3.2.1-15	A
			Air with Reactor Coolant Leakage (External)	Cumulative Fatigue Damage	TLAA	IV.C1.RP-44	3.1.1-11	A, 3
				Loss of Material	Bolting Integrity (B.2.1.11)	IV.C1.RP-42	3.1.1-63	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	IV.C1.RP-43	3.1.1-67	A
		High Strength Low Alloy Steel Bolting with Yield Strength of 150 ksi or Greater	Air with Reactor Coolant Leakage (External)	Cracking	Bolting Integrity (B.2.1.11)	V.E.E-03	3.2.1-12	A
				Cumulative Fatigue Damage	TLAA	IV.C1.RP-44	3.1.1-11	A, 3
				Loss of Material	Bolting Integrity (B.2.1.11)	IV.C1.RP-42	3.1.1-63	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	IV.C1.RP-43	3.1.1-67	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	IV.C1.RP-44	3.1.1-11	A, 3
				Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	IV.C1.RP-43	3.1.1-67	A
Class 1 Piping, Fittings and Branch Connections < NPS 4"	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.C1.RP-230	3.1.1-39	A
					One-time Inspection of ASME Code Class 1 Small-Bore Piping (B.2.1.23)	IV.C1.RP-230	3.1.1-39	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-230	3.1.1-39	B
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.C1.RP-39	3.1.1-31	E, 1
					Water Chemistry (B.2.1.2)	IV.C1.RP-39	3.1.1-31	D
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	IV.C1.R-23	3.1.1-60	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.C1.RP-230	3.1.1-39	A
					One-time Inspection of ASME Code Class 1 Small-Bore Piping (B.2.1.23)	IV.C1.RP-230	3.1.1-39	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Class 1 Piping, Fittings and Branch Connections < NPS 4"	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	Water Chemistry (B.2.1.2)	IV.C1.RP-230	3.1.1-39	B
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	B
Flow Device (Instrumentation Orifices)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Throttle	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
Flow Device (Main Steam Line Flow Restrictors)	Throttle	Cast Austenitic Stainless Steel (CASS)	Steam	Cracking	One-Time Inspection (B.2.1.21)	VIII.B2.SP-98	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-98	3.4.1-11	B
				Loss of Material	TLAA			H, 5
					One-Time Inspection (B.2.1.21)	VIII.B2.SP-155	3.4.1-16	A, 4
					Water Chemistry (B.2.1.2)	VIII.B2.SP-155	3.4.1-16	B
Heat Exchanger - (EHC Fluid) Tube Side Components	Leakage Boundary	Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	C

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (EHC Fluid) Tube Side Components	Leakage Boundary	Copper Alloy with 15% Zinc or More	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.21)	V.D2.EP-76	3.2.1-50	C
Heat Exchanger - (Motor Oil Coolers) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	C
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	C
Heat Exchanger - (Motor Winding Coolers) Tube Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	V.D2.EP-92	3.2.1-30	A
Heat Exchanger - (Motor Winding Coolers) Tubes	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	V.D2.EP-97	3.2.1-32	C
Hoses	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D1.EP-80	3.2.1-50	A
					One-Time Inspection (B.2.1.21)	V.D1.EP-80	3.2.1-50	A
Piping, piping components, and piping elements	Leakage Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-3	3.2.1-56	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Aluminum Alloy	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-162	3.3.1-99	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-162	3.3.1-99	A
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-76	3.2.1-50	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-76	3.2.1-50	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Lubricating Oil (Internal)	None	None	VII.J.AP-15	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D1.EP-80	3.2.1-50	A
					One-Time Inspection (B.2.1.21)	V.D1.EP-80	3.2.1-50	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.C1.RP-39	3.1.1-31	E, 1
					Water Chemistry (B.2.1.2)	IV.C1.RP-39	3.1.1-31	D
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	IV.C1.R-23	3.1.1-60	A
			Steam (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D1.EP-80	3.2.1-50	A
					One-Time Inspection (B.2.1.21)	V.D1.EP-80	3.2.1-50	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.C1.R-20	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.C1.R-20	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	B
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
			Treated Water > 140 F (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	V.D2.E-37	3.2.1-54	A
					Water Chemistry (B.2.1.2)	V.D2.E-37	3.2.1-54	B
				Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
Pump Casing (EHC Skid)	Leakage Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (EHC Skid)	Leakage Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
Pump Casing (RRP)	Pressure Boundary	Cast Austenitic Stainless Steel (CASS)	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.C1.R-20	3.1.1-97	E, 2
					Water Chemistry (B.2.1.2)	IV.C1.R-20	3.1.1-97	D
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 3
				Loss of Fracture Toughness	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.C1.R-08	3.1.1-38	A
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	B
RPV Flange Leak Detection Line	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.C1.RP-39	3.1.1-31	E, 1
					Water Chemistry (B.2.1.2)	IV.C1.RP-39	3.1.1-31	D
Tanks (EHC Reservoir)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (EHC Reservoir)	Leakage Boundary	Carbon Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	C
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	C
Valve Body	Leakage Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-3	3.2.1-56	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-162	3.3.1-99	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-162	3.3.1-99	A
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-76	3.2.1-50	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-76	3.2.1-50	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D1.EP-80	3.2.1-50	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D1.EP-80	3.2.1-50	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.C1.RP-39	3.1.1-31	E, 1
					Water Chemistry (B.2.1.2)	IV.C1.RP-39	3.1.1-31	D
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	IV.C1.R-23	3.1.1-60	A
			Steam (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
		Cast Austenitic Stainless Steel (CASS)	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Cast Austenitic Stainless Steel (CASS)	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.C1.R-20	3.1.1-97	E, 2
					Water Chemistry (B.2.1.2)	IV.C1.R-20	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 3
				Loss of Fracture Toughness	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.C1.R-08	3.1.1-38	A
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D1.EP-80	3.2.1-50	A
					One-Time Inspection (B.2.1.21)	V.D1.EP-80	3.2.1-50	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.C1.R-20	3.1.1-97	E, 2
					Water Chemistry (B.2.1.2)	IV.C1.R-20	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	B
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 3

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B

Table 3.1.2-1 Reactor Coolant Pressure Boundary System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The One-Time Inspection (B.2.1.21) program is substituted to manage the aging effects applicable to this component type, material and environment combination.

2. The ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD (B.2.1.1) program is substituted to manage the aging effects applicable to this component type, material and environment combination.

3. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

4. The internal venturi section of each main steam line flow restrictor is fabricated from centrifugally cast low molybdenum content SA-351 Type CF8 CASS material. Therefore, these components are not susceptible to loss of fracture toughness due to thermal aging embrittlement.

5. The TLAA designation in the Aging Management Program column indicates that erosion of the main steam line flow restrictors is evaluated in Section 4.7.

Table 3.1.2-2
Reactor Vessel
Summary of Aging Management Evaluation

Table 3.1.2-2 Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Closure Studs - RPV)	Mechanical Closure	High Strength Low Alloy Steel Bolting with Yield Strength of 150 ksi or Greater	Air with Reactor Coolant Leakage (External)	Cracking	Reactor Head Closure Stud Bolting (B.2.1.3)	IV.A1.RP-51	3.1.1-91	B
				Cumulative Fatigue Damage	TLAA	IV.A1.RP-201	3.1.1-1	A, 2
				Loss of Material	Reactor Head Closure Stud Bolting (B.2.1.3)	IV.A1.RP-165	3.1.1-91	B
Bolting (Head Spray, CRD Housing, Head Vent, Spare Nozzle)	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air with Reactor Coolant Leakage (External)	Cumulative Fatigue Damage	TLAA	IV.C1.RP-44	3.1.1-11	A, 2
				Loss of Material	Bolting Integrity (B.2.1.11)	IV.C1.RP-42	3.1.1-63	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	IV.C1.RP-43	3.1.1-67	A
N-1 Nozzle (Recirculation Outlet)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-1 Nozzle (Recirculation Outlet)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-1 Nozzle Safe Ends and Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-2 Nozzle (Recirculation Inlet)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-2 Nozzle (Recirculation Inlet)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-2 Nozzle Safe Ends and Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-2 Nozzle Thermal Sleeve	Direct Flow	Stainless Steel	Reactor Coolant	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	D

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-2 Nozzle Thermal Sleeve	Direct Flow	Stainless Steel	Reactor Coolant	Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-3 Nozzle (Steam Outlet)	Pressure Boundary	Low Alloy Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	B
N-3 Nozzle Safe Ends and Welds	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	D
N-4 Nozzle (Feedwater)	Pressure Boundary	Low Alloy Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cracking	BWR Feedwater Nozzle (B.2.1.5)	IV.A1.R-65	3.1.1-95	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	D
N-4 Nozzle Safe Ends and Welds	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	C

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-4 Nozzle Safe Ends and Welds	Pressure Boundary	Carbon Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	D
		Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
		Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-4 Nozzle Thermal Sleeve	Direct Flow	Stainless Steel	Reactor Coolant	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	D
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-5 Nozzle (Low Pressure Core Spray)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-5 Nozzle (Low Pressure Core Spray)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-5 Nozzle Safe End Extension	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	D
N-5 Nozzle Safe Ends and Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-5 Nozzle Thermal Sleeve	Direct Flow	Stainless Steel	Reactor Coolant	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	D
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-5 Nozzle Thermal Sleeve	Direct Flow	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-5 Thermal Sleeve Extension	Direct Flow	Nickel Alloy	Reactor Coolant	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	D
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-6 Nozzle (RHR / LPCI)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant and Neutron Flux (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Fracture Toughness	Reactor Vessel Surveillance (B.2.1.20)	IV.A1.RP-227	3.1.1-14	A
					TLAA	IV.A1.R-67	3.1.1-13	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-6 Nozzle Safe End Extensions	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant and Neutron Flux (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	D

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-6 Nozzle Safe Ends and Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant and Neutron Flux (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-6 Nozzle Thermal Sleeve Extension (Unit 2 Only)	Pressure Boundary	Nickel Alloy	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	D
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-6 Thermal Sleeve	Direct Flow	Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	D
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-7 Nozzle (Top Head Spray / RCIC - Flanged)	Pressure Boundary	Low Alloy Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	B

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-7 Nozzle Flange	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-7 Nozzle Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-8 Nozzle (Top Head Vent - Flanged)	Pressure Boundary	Low Alloy Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	B
N-8 Nozzle Flange	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-8 Nozzle Flange	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-8 Nozzle Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N-9 Nozzle (Jet Pump Instrumentation)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N-9 Nozzle Safe End and Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N10 Nozzle (CRD Hydraulic System Return Line - Capped)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cracking	BWR Control Rod Drive Return Line Nozzle (B.2.1.6)	IV.A1.R-66	3.1.1-96	A
					ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N10 Nozzle (CRD Hydraulic System Return Line - Capped)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N10 Nozzle Cap and Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N11 Nozzle (Core Differential Pressure and Liquid Control)	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Penetrations (B.2.1.8)	IV.A1.RP-369	3.1.1-98	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-369	3.1.1-98	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N11 Nozzle Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N11 Nozzle Welds	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N12 Nozzle (Water Level Instrumentation - 366" Elevation)	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant and Neutron Flux (Internal)	Cracking	BWR Penetrations (B.2.1.8)	IV.A1.RP-369	3.1.1-98	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-369	3.1.1-98	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N12 Nozzle Extension and Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant and Neutron Flux (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N12 Nozzle Extension and Welds	Pressure Boundary	Nickel Alloy	Reactor Coolant and Neutron Flux (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant and Neutron Flux (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N13 Nozzle (Water Level Instrumentation - 517" Elevation)	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Penetrations (B.2.1.8)	IV.A1.RP-369	3.1.1-98	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-369	3.1.1-98	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N13 Nozzle Extension	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N13 Nozzle Extension	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N13 Nozzle Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N13 Nozzle Welds	Pressure Boundary	Stainless Steel	Reactor Coolant (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N14 Nozzle (Water Level Instrumentation - 599" Elevation)	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Penetrations (B.2.1.8)	IV.A1.RP-369	3.1.1-98	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-369	3.1.1-98	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N14 Nozzle Extension	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N14 Nozzle Extension Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N14 Nozzle Extension Welds	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N15 Nozzle (Bottom Head Drain)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	D
		Carbon or Low Alloy Steel with Nickel Alloy Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N16 Nozzle (High Pressure Core Spray)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N16 Nozzle (High Pressure Core Spray)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N16 Nozzle Safe End Extensions	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	D
N16 Nozzle Safe Ends and Welds	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N16 Thermal Sleeve	Direct Flow	Stainless Steel	Reactor Coolant	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	D
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N16 Thermal Sleeve	Direct Flow	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N16 Thermal Sleeve Extension (Unit 2 Only)	Direct Flow	Nickel Alloy	Reactor Coolant	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	D
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N17 Nozzle (Seal Leak Detection)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	D
		Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N18 (Top Head Spare - Flanged)	Pressure Boundary	Low Alloy Steel	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N18 (Top Head Spare - Flanged)	Pressure Boundary	Low Alloy Steel	Reactor Coolant (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	D
		Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N18 Nozzle Flange	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant (Internal)	Cracking	BWR Stress Corrosion Cracking (B.2.1.7)	IV.A1.R-68	3.1.1-97	A
					Water Chemistry (B.2.1.2)	IV.A1.R-68	3.1.1-97	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N19 CRD Nozzle (Housing and Flange)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	Cracking	BWR Penetrations (B.2.1.8)	IV.A1.RP-369	3.1.1-98	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-369	3.1.1-98	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N19 CRD Nozzle (Housing and Flange)	Pressure Boundary	Stainless Steel	Reactor Coolant	Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N19 CRD Nozzle (Welds)	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant	Cracking	BWR Penetrations (B.2.1.8)	IV.A1.RP-369	3.1.1-98	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-369	3.1.1-98	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N19 CRD Nozzles (Stub Tubes)	Pressure Boundary	Nickel Alloy	Reactor Coolant (Internal)	Cracking	BWR Penetrations (B.2.1.8)	IV.A1.RP-369	3.1.1-98	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-369	3.1.1-98	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
N20 Incore Monitor Nozzles (Housing and Flange)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	Cracking	BWR Penetrations (B.2.1.8)	IV.A1.RP-369	3.1.1-98	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-369	3.1.1-98	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
N20 Incore Monitor Nozzles (Housing and Flange)	Pressure Boundary	Stainless Steel	Reactor Coolant	Loss of Material	Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
Reactor Vessel (Bottom Head and Welds)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
Reactor Vessel (Shell, Lower Flange, and Welds)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant and Neutron Flux (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Fracture Toughness	Reactor Vessel Surveillance (B.2.1.20)	IV.A1.RP-227	3.1.1-14	A
					TLAA	IV.A1.R-62	3.1.1-13	A, 3
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Reactor Vessel (Shell, Lower Flange, and Welds)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant and Neutron Flux (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
Reactor Vessel (Top Head, Upper Flange, and Welds)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	None	None	V.E.E-44	3.2.1-40	I, 1
			Reactor Coolant (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.A1.RP-371	3.1.1-30	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-371	3.1.1-30	D
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
Reactor Vessel External Attachments (Refueling Bellows Support)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	C
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	D
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	IV.A1.R-70	3.1.1-4	A, 2
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Reactor Vessel External Attachments (Support Skirt and Stabilizer Bracket)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	IV.A1.R-70	3.1.1-4	A, 2
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
Reactor Vessel Internal Attachments	Structural Support to maintain core configuration and flow distribution	Nickel Alloy	Reactor Coolant	Cracking	BWR Vessel ID Attachment Welds (B.2.1.4)	IV.A1.R-64	3.1.1-94	A
					Water Chemistry (B.2.1.2)	IV.A1.R-64	3.1.1-94	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
		Stainless Steel	Reactor Coolant	Cracking	BWR Vessel ID Attachment Welds (B.2.1.4)	IV.A1.R-64	3.1.1-94	A
					Water Chemistry (B.2.1.2)	IV.A1.R-64	3.1.1-94	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B
			Reactor Coolant and Neutron Flux	Cracking	BWR Vessel ID Attachment Welds (B.2.1.4)	IV.A1.R-64	3.1.1-94	A
					Water Chemistry (B.2.1.2)	IV.A1.R-64	3.1.1-94	B
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 2

Table 3.1.2-2 Reactor Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Reactor Vessel Internal Attachments	Structural Support to maintain core configuration and flow distribution	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Material	One-Time Inspection (B.2.1.21)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	B

Table 3.1.2-2 Reactor Vessel (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. During power operation the insulated reactor vessel, nozzles, and safe end components have external temperature greater than 212 degrees F and are at a higher temperature than the air-indoor (uncontrolled) environment. During plant shutdown the containment atmosphere is normally below the dewpoint temperature. Therefore, wetting due to condensation and moisture accumulation will not occur during power operation or plant shutdown and loss of material due to general corrosion does not apply.

2. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

3. The TLAA designation in the Aging Management Program column indicates loss of fracture toughness due to neutron embrittlement of this component is evaluated in Section 4.2.

Table 3.1.2-3

Reactor Vessel Internals

Summary of Aging Management Evaluation

Table 3.1.2-3 Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Core Shroud (Including Repairs) and Core Plate: Core Shroud (Upper, Central, Lower)	Structural Support to maintain core configuration and flow distribution	Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-92	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-92	3.1.1-103	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
Core Shroud (Including Repairs) and Core Plate: Shroud Support Structure (Shroud Support Cylinder, Shroud Support Plate, Shroud Support Legs and Gussets)	Structural Support to maintain core configuration and flow distribution	Nickel Alloy	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-96	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-96	3.1.1-103	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B

Table 3.1.2-3 Reactor Vessel Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Core Shroud and Core Plate: Access Hole Cover (Welded Covers)	Direct Flow	Nickel Alloy	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-94	3.1.1-29	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.R-94	3.1.1-29	B
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
		Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-97	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-97	3.1.1-103	B
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
Core Shroud and Core Plate: Core Plate, Core Plate Bolts	Structural Support to maintain core configuration and flow distribution	Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-93	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-93	3.1.1-103	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
		Stainless Steel Bolting	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-93	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-93	3.1.1-103	B
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
				Loss of Preload	TLAA			H, 3

Table 3.1.2-3 Reactor Vessel Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Core Shroud and Core Plate: LPCI Coupling	Direct Flow	Cast Austenitic Stainless Steel (CASS)	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-93	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-93	3.1.1-103	B
				Loss of Fracture Toughness	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-219	3.1.1-99	C
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
		Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-97	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-97	3.1.1-103	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
		X-750 alloy	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-381	3.1.1-104	A
					Water Chemistry (B.2.1.2)	IV.B1.RP-381	3.1.1-104	B
				Loss of Fracture Toughness	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-200	3.1.1-99	A
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
Core Spray Lines and Spargers: Core Spray Lines (Headers), Spray Rings, Spray Nozzles	Direct Flow	Cast Austenitic Stainless Steel (CASS)	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-99	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-99	3.1.1-103	B

Table 3.1.2-3 Reactor Vessel Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Core Spray Lines and Spargers: Core Spray Lines (Headers), Spray Rings, Spray Nozzles	Direct Flow	Cast Austenitic Stainless Steel (CASS)	Reactor Coolant and Neutron Flux	Loss of Fracture Toughness	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-219	3.1.1-99	C
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
		Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-99	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-99	3.1.1-103	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
Fuel Supports and Control Rod Drive Assemblies: Orificed Fuel Support	Structural Support to maintain core configuration and flow distribution	Cast Austenitic Stainless Steel (CASS)	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-104	3.1.1-102	A
					Water Chemistry (B.2.1.2)	IV.B1.R-104	3.1.1-102	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Fracture Toughness	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-220	3.1.1-99	A
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
	Throttle	Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-104	3.1.1-102	A
					Water Chemistry (B.2.1.2)	IV.B1.R-104	3.1.1-102	B

Table 3.1.2-3 Reactor Vessel Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Fuel Supports and Control Rod Drive Assemblies: Orificed Fuel Support	Throttle	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
Instrumentation: Intermediate Range Monitor (IRM) Dry Tubes, Source Range Monitor (SRM) Dry Tubes, Incore Neutron Flux Monitor Guide Tubes	Structural Support to maintain core configuration and flow distribution	Stainless Steel	Air/Gas - Dry (Internal)	None	None	IV.E.RP-07	3.1.1-107	C
			Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-105	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-105	3.1.1-103	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
Jet Pump Assemblies: Castings	Direct Flow	Cast Austenitic Stainless Steel (CASS)	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	B
				Loss of Fracture Toughness	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-219	3.1.1-99	A
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B

Table 3.1.2-3 Reactor Vessel Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Jet Pump Assemblies: Inlet Riser and Brace, Holddown Beam, Diffuser, Tailpipe, Wedges, and Repair Components	Direct Flow	Nickel Alloy	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	B
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
		Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-100	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-100	3.1.1-103	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
					BWR Vessel Internals (B.2.1.9)	IV.B1.RP-377	3.1.1-100	A
				Loss of Preload	TLAA			H, 4
		X-750 alloy	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-381	3.1.1-104	A
					Water Chemistry (B.2.1.2)	IV.B1.RP-381	3.1.1-104	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Fracture Toughness	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-200	3.1.1-99	A
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2

Table 3.1.2-3 Reactor Vessel Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Jet Pump Assemblies: Inlet Riser and Brace, Holddown Beam, Diffuser, Tailpipe, Wedges, and Repair Components	Direct Flow	X-750 alloy	Reactor Coolant and Neutron Flux	Loss of Material	Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
					BWR Vessel Internals (B.2.1.9)			F, 5
				Loss of Preload	TLAA			H, 4
Reactor Vessel Internals Components: Control Rod Drive Guide Tube	Structural Support to maintain core configuration and flow distribution	Cast Austenitic Stainless Steel (CASS)	Reactor Coolant	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-104	3.1.1-102	A
					Water Chemistry (B.2.1.2)	IV.B1.R-104	3.1.1-102	B
				Loss of Fracture Toughness	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-220	3.1.1-99	A
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
		Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-104	3.1.1-102	C
					Water Chemistry (B.2.1.2)	IV.B1.R-104	3.1.1-102	D
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
Reactor Vessel Internals Components: Core Plate DP/SLC Line	Direct Flow	Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-99	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-99	3.1.1-103	D

Table 3.1.2-3 Reactor Vessel Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Reactor Vessel Internals Components: Core Plate DP/SLC Line	Direct Flow	Stainless Steel	Reactor Coolant and Neutron Flux	Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
Steam Dryers	Structural Integrity	Stainless Steel	Reactor Coolant	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-155	3.1.1-101	A
						IV.B1.R-104	3.1.1-102	C
					Water Chemistry (B.2.1.2)	IV.B1.R-104	3.1.1-102	D
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B
Top Guide	Structural Support to maintain core configuration and flow distribution	Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-98	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-98	3.1.1-103	B
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 1
				Loss of Material	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-26	3.1.1-43	E, 2
					Water Chemistry (B.2.1.2)	IV.B1.RP-26	3.1.1-43	B

Table 3.1.2-3 Reactor Vessel Internals (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.
2. The BWR Vessel Internals (B.2.1.9) program is substituted to manage the aging effect(s) applicable to this component type, material and environment combination.
3. The TLAA designation in the Aging Management Program column indicates that loss of preload of the core plate rim bolts due to high neutron fluence is evaluated in Section 4.2.
4. The TLAA designation in the Aging Management Program column indicates that loss of preload due to neutron fluence of the jet pump riser brace repair clamps, and jet pump slip joint clamps is evaluated in Section 4.2.
5. The BWR Vessel Internals (B.2.1.9) program is used to manage loss of material due to wear of X-750 alloy replacement jet pump main wedges and auxiliary wedges.

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.

- High Pressure Core Spray System (2.3.2.1)
- Low Pressure Core Spray System (2.3.2.2)
- Reactor Core Isolation Cooling System (2.3.2.3)
- Residual Heat Removal System (2.3.2.4)
- Standby Gas Treatment System (2.3.2.5)

3.2.2 RESULTS

The following tables summarize the results of the aging management review for Engineered Safety Features.

Table 3.2.2-1 High Pressure Core Spray System - Summary of Aging Management Evaluation

Table 3.2.2-2 Low Pressure Core Spray System - Summary of Aging Management Evaluation

Table 3.2.2-3 Reactor Core Isolation Cooling System - Summary of Aging Management Evaluation

Table 3.2.2-4 Residual Heat Removal System - Summary of Aging Management Evaluation

Table 3.2.2-5 Standby Gas Treatment System - Summary of Aging Management Evaluation

3.2.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Management Programs

3.2.2.1.1 High Pressure Core Spray System

Materials

The materials of construction for the High Pressure Core Spray System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Carbon or Low Alloy Steel with Stainless Steel Cladding

- Glass
- Stainless Steel
- Stainless Steel Bolting
- Zinc

Environments

The High Pressure Core Spray System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Lubricating Oil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the High Pressure Core Spray System components require management:

- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the High Pressure Core Spray System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Flow-Accelerated Corrosion (B.2.1.10)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- TLAA
- Water Chemistry (B.2.1.2)

3.2.2.1.2 Low Pressure Core Spray System

Materials

The materials of construction for the Low Pressure Core Spray System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting

- Carbon or Low Alloy Steel with Stainless Steel Cladding
- Copper Alloy with less than 15% Zinc
- Glass
- Stainless Steel
- Stainless Steel Bolting
- Zinc

Environments

The Low Pressure Core Spray System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Lubricating Oil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Low Pressure Core Spray System components require management:

- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Low Pressure Core Spray System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Flow-Accelerated Corrosion (B.2.1.10)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- TLAA
- Water Chemistry (B.2.1.2)

3.2.2.1.3 Reactor Core Isolation Cooling System

Materials

The materials of construction for the Reactor Core Isolation Cooling System components are:

- Carbon Steel
- Carbon Steel (with internal coating)
- Carbon and Low Alloy Steel Bolting
- Carbon or Low Alloy Steel with Stainless Steel Cladding
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Glass
- Gray Cast Iron
- Nickel Alloy
- Stainless Steel
- Stainless Steel Bolting
- Zinc

Environments

The Reactor Core Isolation Cooling System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Condensation
- Lubricating Oil
- Soil
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Reactor Core Isolation Cooling System components require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Coating Integrity

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Core Isolation Cooling System components:

- Bolting Integrity (B.2.1.11)
- Buried and Underground Piping (B.2.1.28)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- Selective Leaching (B.2.1.22)
- Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)
- TLAA
- Water Chemistry (B.2.1.2)

3.2.2.1.4 Residual Heat Removal System

Materials

The materials of construction for the Residual Heat Removal System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Carbon or Low Alloy Steel with Stainless Steel Cladding
- Glass
- Nickel Alloy
- Stainless Steel
- Stainless Steel Bolting

Environments

The Residual Heat Removal System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation
- Lubricating Oil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Residual Heat Removal System components require management:

- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Residual Heat Removal System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- TLAA
- Water Chemistry (B.2.1.2)

3.2.2.1.5 Standby Gas Treatment System

Materials

The materials of construction for the Standby Gas Treatment System components are:

- Aluminum Alloy
- Carbon Steel

- Carbon and Low Alloy Steel Bolting
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Elastomers
- Galvanized Steel
- Glass
- Stainless Steel

Environments

The Standby Gas Treatment System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Standby Gas Treatment System components require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Standby Gas Treatment System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)

3.2.2.2 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. For the Engineered Safety Features, those programs are addressed in the following subsections.

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). The evaluation of metal fatigue as a TLAA for the Control Rod Drive System, High Pressure Core Spray System, Low Pressure Core Spray System, Reactor Coolant Pressure Boundary System, Reactor Core Isolation Cooling System, Reactor Water Cleanup System, and Residual Heat Removal 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 (Appendix A.1 of this SRP-LR).

Item Number 3.2.1-2 is applicable to PWRs only and is not used for LSCS.

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 in 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 (Appendix A.1 of this SRP-LR).*

   Item Number 3.2.1-3 is applicable to PWRs and is not used for LSCS. There are no partially encased stainless steel tanks exposed to raw water in Engineered Safety Features systems at LSCS.

2. *Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air. The possibility of pitting and crevice corrosion also extends to components exposed to air which has recently been introduced into buildings, i.e., components near intake vents. Pitting and crevice corrosion is only known to occur in environments containing sufficient halides (primarily chlorides) and in which condensation or deliquescence is possible. Condensation or deliquescence should generally be assumed to be possible. Applicable outdoor air environments (and associated indoor air environments) include, but are not limited to, those within approximately 5 miles of a saltwater coastline, those within 1/2 mile of a highway which is treated with salt in the wintertime, those areas in which the soil contains more than trace chlorides, those plants having cooling towers where the water is treated with chlorine or chlorine compounds, and those areas subject to chloride contamination from other agricultural or industrial sources. This item is applicable for the environments described above.*

GALL AMP XI.M36, "External Surfaces Monitoring," is an acceptable method to manage the aging effect. The applicant may demonstrate that this item is not applicable by describing the outdoor air environment present at the plant and demonstrating that external pitting or crevice corrosion is not expected. The GALL Report recommends further evaluation to determine whether an aging management program is needed to manage this aging effect based on the environmental conditions applicable to the plant and requirements applicable to the components.

LSCS will implement the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program to manage the loss of material due to pitting and crevice corrosion in stainless steel piping, piping components, and piping elements exposed to outdoor air in the Reactor Core Isolation Cooling System. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program provides for management of aging effects through periodic visual inspection of external surfaces for evidence of the loss of material. Any visible evidence of the loss of material will be evaluated for acceptability of continued service. Deficiencies will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program is described in Appendix B.

3.2.2.2.4 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 (Appendix A.1 of this SRP-LR).

Item Number 3.2.1-5 is applicable to PWRs only and is not used for LSCS. Loss of material due to erosion for Engineered Safety Features systems at LSCS is addressed in Item Number 3.2.1-65.

3.2.2.2.5 Loss of Material due to General Corrosion and Fouling that Leads to Corrosion

Loss of material due to general corrosion and fouling that leads to corrosion 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 (Appendix A.1 of this SRP-LR).

Item Number 3.2.1-6 is not applicable to LSCS. There are no steel spray system flow orifices or nozzles in an uncontrolled indoor air environment in Engineered Safety

Features systems at LSCS. At LSCS, the drywell and suppression chamber spray nozzles are cast austenitic stainless steel.

3.2.2.2.6 Cracking due to Stress Corrosion Cracking

Cracking due to stress corrosion cracking could occur for stainless steel piping, piping components, piping elements and tanks exposed to outdoor air. The possibility of cracking also extends to components exposed to air which has recently been introduced into buildings, i.e., components near intake vents. Cracking is only known to occur in environments containing sufficient halides (primarily chlorides) and in which condensation or deliquescence is possible. Condensation or deliquescence should generally be assumed to be possible. Applicable outdoor air environments (and associated indoor air environments) include, but are not limited to, those within approximately 5 miles of a saltwater coastline, those within 1/2 mile of a highway which is treated with salt in the wintertime, those areas in which the soil contains more than trace chlorides, those plants having cooling towers where the water is treated with chlorine or chlorine compounds, and those areas subject to chloride contamination from other agricultural or industrial sources. This item is applicable for the environments described above.

GALL AMP XI.M36, "External Surfaces Monitoring," is an acceptable method to manage the aging effect. The applicant may demonstrate that this item is not applicable by describing the outdoor air environment present at the plant and demonstrating that external chloride stress corrosion cracking is not expected. The GALL Report recommends further evaluation to determine whether an aging management program is needed to manage this aging effect based on the environmental conditions applicable to the plant and requirements applicable to the components.

LSCS will implement the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program to manage cracking due to stress corrosion cracking in stainless steel piping, piping components, and piping elements exposed to outdoor air in the Reactor Core Isolation Cooling System. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program provides for management of aging effects through periodic visual inspection of external surfaces for evidence of cracking. Any visible evidence of cracking will be evaluated for acceptability of continued service. Deficiencies will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program is described in Appendix B.

3.2.2.2.7 Quality Assurance for Aging Management of Nonsafety-Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.2.2.2.8 Ongoing Review of Operating Experience

Ongoing review of operating experience is addressed in Appendix A, Section A.1.6 and Appendix B, Section B.1.4.

3.2.2.2.9 Loss of Material due to Recurring Internal Corrosion

Recurring internal corrosion can result in the need to augment AMPs beyond the recommendations in the GALL Report. During the search of plant-specific OE conducted during the LRA development, recurring internal corrosion can be identified by the number of occurrences of aging effects and the extent of degradation at each localized corrosion site. This further evaluation item is applicable if the search of plant-specific OE reveals repetitive occurrences (e.g., one per refueling outage cycle that has occurred over: (a) three or more sequential or nonsequential cycles for a 10-year OE search, or (b) two or more sequential or nonsequential cycles for a 5-year OE search) of aging effects with the same aging mechanism in which the aging effect resulted in the component either not meeting plant-specific acceptance criteria or experiencing a reduction in wall thickness greater than 50 percent (regardless of the minimum wall thickness.)

The GALL Report recommends that a plant-specific AMP, or a new or existing AMP, be evaluated for inclusion of augmented requirements to ensure the adequate management of any recurring aging effect(s). Potential augmented requirements include: alternative examination methods (e.g., volumetric versus external visual), augmented inspections (e.g., a greater number of locations, additional locations based on risk insights based on susceptibility to aging effect and consequences of failure, a greater frequency of inspections), and additional trending parameters and decision points where increased inspections would be implemented. Acceptance criteria are described in Appendix A.1, "Aging Management Review – Generic (Branch Technical Position RSLB-1)."

The applicant states: (a) why the program's examination methods will be sufficient to detect the recurring aging effect before affecting the ability of a component to perform its intended function, (b) the basis for the adequacy of augmented or lack of augmented inspections, (c) what parameters will be trended as well as the decision points where increased inspections would be implemented (e.g., the extent of degradation at individual corrosion sites, the rate of degradation change), (d) how inspections of components that are not easily accessed (i.e., buried, underground) will be conducted, and (e) how leaks in any involved buried or underground components will be identified.

Each plant-specific operating experience example should be evaluated to determine if the chosen AMP should be augmented even if the thresholds for significance of aging effect or frequency of occurrence of aging effect have not been exceeded. For example, during a 10-year search of plant specific operating experience, two instances of 360 degree 30 percent wall loss occurred at copper alloy to steel joints. Neither the significance of the aging effect nor the frequency of occurrence of aging effect threshold has been exceeded. Nevertheless, the operating experience should be evaluated to determine if the AMP that is proposed to manage the aging effect is sufficient (e.g., method of inspection, frequency of inspection, number of inspections) to provide reasonable assurance that the CLB intended functions of the component will be met throughout the period of extended operation. Likewise, the GALL Report AMR items associated with the new FE items only cite raw water and waste water environments because OE indicates that these are the predominant environments associated with recurring internal corrosion; however, if the search of plant-specific OE reveals recurring internal corrosion in other water environments (e.g., treated water), the aging effect should be addressed in a similar manner.

LR-ISG-2012-02 has been issued which addresses instances of recurring internal corrosion identified during review of plant-specific operating experience. The operating experience for LSCS has been reviewed and instances of recurring internal corrosion in the Engineered Safety Features systems have not been identified with a frequency that is consistent with the thresholds discussed in LR-ISG-2012-02.

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 Analyses
- Section 4.3.2, ASME Section III, Class 2 and 3 and ANSI B31.1 Allowable Stress Analyses
- Section 4.3.5, High-Energy Line Break (HELB) Analyses Based Upon Fatigue

3.2.3 CONCLUSION

The Engineered Safety Features piping, fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Engineered Safety Features components are identified in the summaries in Section 3.2.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Engineered Safety Features components will be adequately managed so that there is reasonable assurance that the intended functions are maintained consistent with the current licensing basis during 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	Stainless steel, Steel Piping, piping components, and piping elements exposed to Treated water (borated)	Cumulative fatigue damage due to fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the SRP, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.2.2.2.1.
3.2.1-2	PWR Only				
3.2.1-3	PWR Only				
3.2.1-4	Stainless steel Piping, piping components, and piping elements; tanks exposed to Air – outdoor	Loss of material due to pitting and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of stainless steel piping, piping components, and piping elements exposed to air - outdoor in the Reactor Core Isolation Cooling System. See subsection 3.2.2.2.3.2.
3.2.1-5	PWR 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	Steel Drywell and suppression chamber spray system (internal surfaces): flow orifice; spray nozzles exposed to Air – indoor, uncontrolled (Internal)	Loss of material due to general corrosion; fouling that leads to corrosion	A plant-specific aging management program is to be evaluated	Yes, plant-specific	Not Applicable. See subsection 3.2.2.2.5.
3.2.1-7	Stainless steel Piping, piping components, and piping elements; tanks exposed to Air – outdoor	Cracking due to stress corrosion cracking	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage cracking of stainless steel piping, piping components, and piping elements exposed to air - outdoor in the Reactor Core Isolation Cooling System. See subsection 3.2.2.2.6.
3.2.1-8	PWR Only				
3.2.1-9	PWR Only				
3.2.1-10	Cast austenitic stainless steel Piping, piping components, and piping elements exposed to Treated water (borated) >250°C (>482°F), Treated water >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Chapter XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No	Not Applicable. There are no cast austenitic stainless steel piping components, and piping elements exposed to treated water (borated) >250°C (>482°F) or treated water >250°C (>482°F) in Engineered Safety Features 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
3.2.1-11	Steel Piping, piping components, and piping elements exposed to Steam, Treated water	Wall thinning due to flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No	Consistent with NUREG-1801. The Flow-Accelerated Corrosion (B.2.1.10) program will be used to manage wall thinning of the carbon steel piping, piping components, and piping elements exposed to steam and treated water in the Reactor Coolant Pressure Boundary System, Reactor Core Isolation Cooling System, Reactor Water Cleanup System, and Residual Heat Removal System.
3.2.1-12	Steel, high-strength Closure bolting exposed to Air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage cracking of the high strength low alloy steel bolting exposed to air with the potential for reactor coolant leakage in the Reactor Coolant Pressure Boundary System.
3.2.1-13	Steel; stainless steel Bolting, Closure bolting exposed to Air – outdoor (External), Air – indoor, uncontrolled (External)	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage loss of material of the carbon and low alloy steel and stainless steel bolting exposed to air - indoor uncontrolled in the High Pressure Core Spray System, Low Pressure Core Spray System, Reactor Coolant Pressure Boundary System, Reactor Core Isolation Cooling System, Residual Heat Removal System, and Standby Gas Treatment System.
3.2.1-14	Steel Closure bolting exposed to Air with steam or water leakage	Loss of material due to general corrosion	Chapter XI.M18, "Bolting Integrity"	No	Not Applicable. There is no steel closure bolting exposed to air with steam or water leakage in Engineered Safety Features 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
3.2.1-15	Copper alloy, Nickel alloy, Steel; stainless steel, Stainless steel, Steel; stainless steel Bolting, Closure bolting exposed to Any environment, Air – outdoor (External), Raw water, Treated borated water, Fuel oil, Treated water, Air – indoor, uncontrolled (External)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage loss of preload of the carbon and low alloy steel and stainless steel bolting exposed to air - indoor uncontrolled and treated water in the High Pressure Core Spray System, Low Pressure Core Spray System, Reactor Coolant Pressure Boundary System, Reactor Core Isolation Cooling System, Residual Heat Removal System, and Standby Gas Treatment System.
3.2.1-16	Steel Containment isolation piping and components (Internal surfaces), Piping, piping components, and piping elements exposed to Treated water	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and the Water Chemistry (B.2.1.2) program will be used to manage loss of material of the carbon steel and gray cast iron heat exchanger components, piping, piping components, and piping elements, reactor vessel external attachments, and tanks exposed to treated water in the High Pressure Core Spray System, Low Pressure Core Spray System, Reactor Coolant Pressure Boundary System, Reactor Core Isolation Cooling System, Reactor Vessel, and Residual Heat Removal System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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
3.2.1-17	Aluminum, Stainless steel Piping, piping components, and piping elements exposed to Treated water	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and the Water Chemistry (B.2.1.2) program will be used to manage loss of material of the carbon or low alloy steel with stainless steel cladding and stainless steel heat exchanger components, and piping, piping components, and piping elements exposed to treated water and treated water > 140 F in the High Pressure Core Spray System, Low Pressure Core Spray System, Reactor Coolant Pressure Boundary System, Reactor Core Isolation Cooling System, and Residual Heat Removal System. The Bolting Integrity (B.2.1.11) program has been substituted and will be used to manage loss of material of stainless steel bolting exposed to treated water in the High Pressure Core Spray System, Low Pressure Core Spray System, Reactor Core Isolation Cooling System, and Residual Heat Removal System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.2.1-18	Stainless steel Containment isolation piping and components (Internal surfaces) exposed to Treated water	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Not Applicable. Stainless steel piping, piping components, and piping elements exposed to treated water in Engineered Safety Features systems are addressed by Item Number 3.2.1-17.

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
3.2.1-19	Stainless steel Heat exchanger tubes exposed to Treated water, Treated water (borated)	Reduction of heat transfer due to fouling	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) and Water Chemistry (B.2.1.2) program will be used to manage reduction of heat transfer of the stainless steel heat exchanger components exposed to treated water in the Residual Heat Removal System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.2.1-20	PWR Only				
3.2.1-21	PWR Only				
3.2.1-22	PWR Only				
3.2.1-23	Steel Heat exchanger components, Containment isolation piping and components (Internal surfaces) exposed to Raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion; fouling that leads to corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no steel heat exchanger components or containment isolation piping and components exposed to raw water in Engineered Safety Features systems.
3.2.1-24	PWR 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
3.2.1-25	Stainless steel Heat exchanger components, Containment isolation piping and components (Internal surfaces) exposed to Raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion; fouling that leads to corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no stainless steel heat exchanger components or containment isolation piping and components exposed to raw water in Engineered Safety Features systems.
3.2.1-26	Stainless steel Heat exchanger tubes exposed to Raw water	Reduction of heat transfer due to fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no stainless steel heat exchanger tubes exposed to raw water in Engineered Safety Features systems.
3.2.1-27	Stainless steel, Steel Heat exchanger tubes exposed to Raw water	Reduction of heat transfer due to fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no stainless steel or steel heat exchanger tubes exposed to raw water in Engineered Safety Features systems.
3.2.1-28	Stainless steel Piping, piping components, and piping elements exposed to Closed-cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no stainless steel piping, piping components, and piping elements exposed to closed-cycle cooling water >60°C (>140°F) in Engineered Safety Features systems.
3.2.1-29	Steel Piping, piping components, and piping elements exposed to Closed-cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no steel piping, piping components, and piping elements exposed to closed-cycle cooling water in Engineered Safety Features 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
3.2.1-30	Steel Heat exchanger components exposed to Closed-cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. The Closed Treated Water Systems (B.2.1.13) program will be used to manage loss of material of the carbon steel heat exchanger components exposed to closed cycle cooling water in the Reactor Coolant Pressure Boundary System.
3.2.1-31	Stainless steel Heat exchanger components, Piping, piping components, and piping elements exposed to Closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no stainless steel heat exchanger components or piping, piping components, and piping elements exposed to closed-cycle cooling water in Engineered Safety Features systems.
3.2.1-32	Copper alloy Heat exchanger components, Piping, piping components, and piping elements exposed to Closed-cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. The Closed Treated Water Systems (B.2.1.13) program will be used to manage loss of material of the copper alloy heat exchanger components exposed to closed cycle cooling water in the Reactor Coolant Pressure Boundary System.
3.2.1-33	Copper alloy, Stainless steel Heat exchanger tubes exposed to Closed-cycle cooling water	Reduction of heat transfer due to fouling	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no copper alloy or stainless steel heat exchanger tubes exposed to closed-cycle cooling water in Engineered Safety Features 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
3.2.1-34	Copper alloy (>15% Zn or >8% Al) Piping, piping components, and piping elements, Heat exchanger components exposed to Closed-cycle cooling water	Loss of material due to selective leaching	Chapter XI.M33, “Selective Leaching”	No	Not Applicable. There are no copper alloy (>15% Zn or >8% Al) piping, piping components, and piping elements or heat exchanger components exposed to closed-cycle cooling water in Engineered Safety Features systems.
3.2.1-35	PWR Only				
3.2.1-36	PWR Only				
3.2.1-37	Gray cast iron Piping, piping components, and piping elements exposed to Soil	Loss of material due to selective leaching	Chapter XI.M33, “Selective Leaching”	No	Not Applicable. There are no gray cast iron piping, piping components, and piping elements exposed to soil in Engineered Safety Features systems.
3.2.1-38	Elastomers Elastomer seals and components exposed to Air – indoor, uncontrolled (External)	Hardening and loss of strength due to elastomer degradation	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage hardening and loss of strength of the elastomer seals and components exposed to air - indoor uncontrolled in the Standby Gas Treatment 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
3.2.1-39	Steel Containment isolation piping and components (External surfaces) exposed to Condensation (External)	Loss of material due to general corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not Applicable. There are no steel containment isolation piping and components exposed to condensation (external) in Engineered Safety Features 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
3.2.1-40	Steel Ducting, piping, and components (External surfaces), Ducting, closure bolting, Containment isolation piping and components (External surfaces) exposed to Air – indoor, uncontrolled (External)	Loss of material due to general corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of the carbon or low alloy steel with stainless steel cladding, carbon steel, carbon steel (with internal coating), and gray cast iron ducting and components, heat exchanger components, piping, piping components, and piping elements, reactor vessel external attachments, and tanks exposed to air – indoor, uncontrolled in the High Pressure Core Spray System, Low Pressure Core Spray System, Reactor Coolant Pressure Boundary System, Reactor Core Isolation Cooling System, Reactor Vessel, Residual Heat Removal System, and Standby Gas Treatment System. The aging effect of loss of material due to general corrosion does not apply to the external surfaces of reactor vessel, nozzle, and safe end components exposed to air-indoor, uncontrolled in the Reactor Vessel System. During power operation the insulated reactor vessel, nozzles, and safe end components have external temperature greater than 212 degrees F and are at a higher temperature than the air-indoor (uncontrolled) environment. During plant shutdown the containment atmosphere is normally below the dewpoint temperature. Therefore, wetting due to condensation and moisture accumulation will not occur during power operation or plant shutdown and loss of material due to general corrosion does not apply.

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	Steel External surfaces exposed to Air – outdoor (External)	Loss of material due to general corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not Applicable. There are no steel external surfaces exposed to air – outdoor in Engineered Safety Features systems.
3.2.1-42	Aluminum Piping, piping components, and piping elements exposed to Air - outdoor	Loss of material due to pitting and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not Applicable. There are no aluminum piping, piping components, and piping elements exposed to air - outdoor in Engineered Safety Features systems.
3.2.1-43	Elastomers Elastomer seals and components exposed to Air – indoor, uncontrolled (Internal)	Hardening and loss of strength due to elastomer degradation	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Not Applicable. There are no elastomer seals and components exposed to air – indoor, uncontrolled (internal) in Engineered Safety Features systems. The internal environment of elastomer seals and components in the Standby Gas Treatment System is considered to be condensation. Hardening and loss of strength of these components is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program.
3.2.1-44	Steel Piping and components (Internal surfaces), Ducting and components (Internal surfaces) exposed to Air – indoor, uncontrolled (Internal)	Loss of material due to general corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Not Applicable. There are no steel piping and components or ducting and components exposed to air – indoor, uncontrolled (internal) in Engineered Safety Features systems. The applicable internal environment for piping and components and ducting and components in Engineered Safety Features systems is considered to be condensation, and is addressed by Item Number 3.2.1-46.

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	PWR Only				
3.2.1-46	Steel Piping and components (Internal surfaces) exposed to Condensation (Internal)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of the carbon steel, galvanized steel, and gray cast iron ducting and components, piping, piping components, and piping elements, and tanks exposed to condensation in the Reactor Core Isolation Cooling System, Residual Heat Removal System, and Standby Gas Treatment System.
3.2.1-47	PWR Only				
3.2.1-48	Stainless steel Piping, piping components, and piping elements (Internal surfaces); tanks exposed to Condensation (Internal)	Loss of material due to pitting and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of the stainless steel ducting and components, piping, piping components, and piping elements, and tanks exposed to condensation in the Combustible Gas Control System, Reactor Core Isolation Cooling System, Residual Heat Removal System, Standby Gas Treatment System, and Standby Liquid Control 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
3.2.1-49	Steel Piping, piping components, and piping elements exposed to Lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.26) program and the One-Time Inspection (B.2.1.21) program will be used to manage loss of material of the carbon steel, carbon steel (with internal coating), and gray cast iron heat exchanger components, piping, piping components, and piping elements, and tanks exposed to lubricating oil in the High Pressure Core Spray System, Low Pressure Core Spray System, Reactor Coolant Pressure Boundary System, Reactor Core Isolation Cooling System, and Residual Heat Removal System.
3.2.1-50	Copper alloy, Stainless steel Piping, piping components, and piping elements exposed to Lubricating oil	Loss of material due to pitting and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.26) program and the One-Time Inspection (B.2.1.21) program will be used to manage loss of material of the copper alloy and stainless steel heat exchanger components, and piping, piping components, and piping elements, exposed to lubricating oil in the Reactor Coolant Pressure Boundary System and Reactor Core Isolation Cooling 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
3.2.1-51	Steel, Copper alloy, Stainless steel Heat exchanger tubes exposed to Lubricating oil	Reduction of heat transfer due to fouling	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.26) program and the One-Time Inspection (B.2.1.21) program will be used to manage reduction of heat transfer of the copper alloy and stainless steel heat exchanger tubes exposed to lubricating oil in the Control Room Ventilation System, Diesel Generator and Auxiliaries System, Essential Cooling Water System, and Reactor Core Isolation Cooling System.
3.2.1-52	Steel (with coating or wrapping) Piping, piping components, and piping elements exposed to Soil or Concrete	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no steel (with coating or wrapping) piping, piping components, and piping elements exposed to soil or concrete in Engineered Safety Features systems.
3.2.1-53	Stainless steel, nickel alloy piping, piping components, and piping elements exposed to soil or concrete	Loss of material due to pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Consistent with NUREG-1801. The Buried and Underground Piping (B.2.1.28) program will be used to manage loss of material of the stainless steel piping, piping components, and piping elements exposed to soil in the Reactor Core Isolation Cooling System.
3.2.1-53x	Steel, stainless steel, nickel alloy underground piping, piping components, and piping elements exposed to air-indoor uncontrolled or condensation (external)	Loss of material due to general (steel only), pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no steel, stainless steel, or nickel alloy underground piping, piping components, and piping elements exposed to air-indoor uncontrolled or condensation (external) in Engineered Safety Features 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
3.2.1-54	Stainless steel Piping, piping components, and piping elements exposed to Treated water >60°C (>140°F)	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking," and Chapter XI.M2, "Water Chemistry"	No	Consistent with NUREG-1801 with exceptions. The BWR Stress Corrosion Cracking (B.2.1.7) program and the Water Chemistry (B.2.1.2) program will be used to manage cracking of the stainless steel piping, piping components, and piping elements exposed to treated water > 140 F in the Reactor Coolant Pressure Boundary System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.2.1-55	Steel Piping, piping components, and piping elements exposed to Concrete	None	None, provided 1) attributes of the concrete are consistent with ACI 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG-1557, and 2) plant OE indicates no degradation of the concrete	No, if conditions are met.	Not Applicable. There are no steel piping, piping components, and piping elements exposed to concrete in Engineered Safety Features systems.
3.2.1-56	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.

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	Copper alloy Piping, piping components, and piping elements exposed to Air – indoor, uncontrolled (External), Gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-58	PWR Only				
3.2.1-59	Galvanized steel Ducting, piping, and components exposed to Air – indoor, controlled (External)	None	None	NA - No AEM or AMP	Not Applicable. There are no galvanized steel ducting, piping, and components exposed to air – indoor, controlled (External) in Engineered Safety Features systems.
3.2.1-60	Glass Piping elements exposed to Air – indoor, uncontrolled (External), Lubricating oil, Raw water, Treated water, Treated water (borated), Air with borated water leakage, Condensation (Internal/External), Gas, Closed-cycle cooling water, Air – outdoor	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-61	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.

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
3.2.1-62	Nickel alloy Piping, piping components, and piping elements exposed to Air with borated water leakage	None	None	NA - No AEM or AMP	Not Applicable. There are no nickel alloy piping, piping components, and piping elements exposed to air with borated water leakage in Engineered Safety Features systems.
3.2.1-63	Stainless steel Piping, piping components, and piping elements exposed to Air – indoor, uncontrolled (External), Air with borated water leakage, Concrete, Gas, Air – indoor, uncontrolled (Internal)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-64	Steel Piping, piping components, and piping elements exposed to Air – indoor, controlled (External), Gas	None	None	NA - No AEM or AMP	Not Applicable. There are no steel piping, piping components, and piping elements exposed to air – indoor, controlled or gas in Engineered Safety Features systems.
3.2.1-65	Any material, piping, piping components, and piping elements exposed to treated water, treated water (borated)	Wall thinning due to erosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No	Consistent with NUREG-1801. The Flow-Accelerated Corrosion (B.2.1.10) program will be used to manage wall thinning of the carbon or low alloy steel with stainless steel cladding, carbon steel, and stainless steel piping, piping components, and piping elements exposed to treated water in the High Pressure Core Spray System, Low Pressure Core Spray System, and Reactor Core Isolation Cooling 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
3.2.1-66	Metallic piping, piping components, and tanks exposed to raw water or waste water	Loss of material due to recurring internal corrosion	A plant-specific aging management program is to be evaluated to address recurring internal corrosion	Yes, plant-specific	Not Applicable. See Subsection 3.2.2.2.9
3.2.1-67	Stainless steel or aluminum tanks (within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to soil or concrete, or the following external environments air-outdoor, air-indoor uncontrolled, moist air, condensation	Cracking due to stress corrosion cracking	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Not Applicable. There are no stainless steel or aluminum tanks (within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to soil or concrete, or exposed to external environments of air-outdoor, air-indoor uncontrolled, moist air, or condensation in Engineered Safety Features systems.
3.2.1-68	Steel, stainless steel, or aluminum tanks (within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to soil or concrete, or the following external environments air-outdoor, air-indoor uncontrolled, moist air, condensation	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Not Applicable. There are no steel, stainless steel, or aluminum tanks (within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to soil or concrete, or external environments of air-outdoor, air-indoor uncontrolled, moist air, or condensation in Engineered Safety Features systems.
3.2.1-69	Insulated steel, stainless steel, copper alloy, or aluminum, piping, piping components, and tanks exposed to condensation, air-outdoor	Loss of material due to general (steel, and copper alloy only), pitting, and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components" or Chapter XI.M29, “Aboveground Metallic Tanks,” (for tanks only)	No	Not Applicable. There are no insulated steel, stainless steel, copper alloy, or aluminum, piping, piping components, and tanks exposed to condensation or air-outdoor in Engineered Safety Features 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
3.2.1-70	Steel, stainless steel or aluminum tanks (within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to treated water, treated borated water	Loss of material due to general (steel only), pitting and crevice corrosion	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Not Applicable. There are no steel, stainless steel or aluminum tanks (within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to treated water or treated borated water in Engineered Safety Features systems.
3.2.1-71	Insulated stainless steel, aluminum, or copper alloy (> 15% Zn) piping, piping components, and tanks exposed to condensation, air-outdoor	Cracking due to stress corrosion cracking	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components" or Chapter XI.M29, “Aboveground Metallic Tanks,” (for tanks only)	No	Not Applicable. There are no insulated stainless steel, aluminum, or copper alloy (> 15% Zn) piping, piping components, and tanks exposed to condensation or air-outdoor in Engineered Safety Features systems.

Table 3.2.2-1
High Pressure Core Spray System
Summary of Aging Management Evaluation

Table 3.2.2-1 High Pressure Core Spray System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-69	3.2.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-69	3.2.1-15	A
			Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.D2.EP-73	3.2.1-17	E, 1, 2
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-122	3.2.1-15	A, 1
Flow Device	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
	Throttle	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A

Table 3.2.2-1 High Pressure Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 5
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 5
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Glass	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-15	3.2.1-60	A
			Lubricating Oil (Internal)	None	None	V.F.EP-16	3.2.1-60	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A

Table 3.2.2-1 High Pressure Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 5
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
		Zinc	Air - Indoor Uncontrolled (External)	None	External Surfaces Monitoring of Mechanical Components (B.2.1.24)			F, 3
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)			F, 4
					One-Time Inspection (B.2.1.21)			F, 4
Pump Casing (HPCS Pump)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
Pump Casing (Water Leg Pump)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
		Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A

Table 3.2.2-1 High Pressure Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Water Leg Pump)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
Strainer Element	Filter	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B

Table 3.2.2-1 High Pressure Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B

Table 3.2.2-1 High Pressure Core Spray System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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 in the Treated Water (External) environment are associated with the submerged HPCS suction strainer assemblies.

2. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect applicable to this component type, material, and environment combination. Submerged bolting for the HPCS System suction strainers in the suppression pool is visually inspected for the loss of material during each ISI inspection interval in conjunction with underwater suppression pool inspections.

3. Component is zinc casting, and in an air-indoor uncontrolled (external) environment there are no aging effects requiring management. Nonetheless, the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program is credited for ensuring the absence of any aging effects.

4. Component is zinc casting, and in a lubricating oil (internal) environment the component is susceptible to loss of material.

5. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.2.2-2

Low Pressure Core Spray System

Summary of Aging Management Evaluation

Table 3.2.2-2 Low Pressure Core Spray System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-69	3.2.1-15	A
		Stainless Steel Bolting	Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.D2.EP-73	3.2.1-17	E, 1, 2
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-122	3.2.1-15	A, 1
Flow Device	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
	Throttle	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A

Table 3.2.2-2 Low Pressure Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Glass	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-15	3.2.1-60	A
			Treated Water (Internal)	None	None	V.F.EP-29	3.2.1-60	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B, 1
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 5
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.A.SP-101	3.4.1-16	A

Table 3.2.2-2 Low Pressure Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Copper Alloy with less than 15% Zinc	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	B
		Glass	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-15	3.2.1-60	A
			Lubricating Oil (Internal)	None	None	V.F.EP-16	3.2.1-60	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
		Zinc	Air - Indoor Uncontrolled (External)	None	External Surfaces Monitoring of Mechanical Components (B.2.1.24)			F, 3
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)			F, 4
					One-Time Inspection (B.2.1.21)			F, 4
Pump Casing (LPCS Pump)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
Pump Casing (Water Leg Pump)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A

Table 3.2.2-2 Low Pressure Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Water Leg Pump)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
Strainer Element	Filter	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A

Table 3.2.2-2 Low Pressure Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B

Table 3.2.2-2 Low Pressure Core Spray System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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 in the Treated Water (External) environment are associated with the submerged LPCS System suction strainers.
2. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect applicable to this component type, material, and environment combination. Submerged bolting for the LPCS System suction strainers in the suppression pool is visually inspected for the loss of material during each ISI inspection interval in conjunction with underwater suppression pool inspections.
3. Component is zinc casting, and in an air-indoor uncontrolled (external) environment there are no aging effects requiring management. Nonetheless, the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program is credited for ensuring the absence of any aging effects.
4. Component is zinc casting, and in a lubricating oil (internal) environment the component is susceptible to loss of material.
5. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.2.2-3
Reactor Core Isolation Cooling System
Summary of Aging Management Evaluation

Table 3.2.2-3 Reactor Core Isolation Cooling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-69	3.2.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-69	3.2.1-15	A
			Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.D2.EP-73	3.2.1-17	E, 1, 2
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-122	3.2.1-15	A, 1
Flow Device	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
	Throttle	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
Heat Exchanger - (Lube Oil Cooler) Shell Side Components	Pressure Boundary	Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	C

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Lube Oil Cooler) Shell Side Components	Pressure Boundary	Copper Alloy with 15% Zinc or More	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.21)	V.D2.EP-76	3.2.1-50	C
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	C
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.21)	V.D2.EP-76	3.2.1-50	C
Heat Exchanger - (Lube Oil Cooler) Tube Sheet	Pressure Boundary	Copper Alloy with less than 15% Zinc	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.21)	V.D2.EP-76	3.2.1-50	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	D
Heat Exchanger - (Lube Oil Cooler) Tubes	Heat Transfer	Copper Alloy with 15% Zinc or More	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-78	3.2.1-51	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-78	3.2.1-51	A
			Treated Water (Internal)	Reduction of Heat Transfer	One-Time Inspection (B.2.1.21)	VIII.E.SP-100	3.4.1-18	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-100	3.4.1-18	B
	Pressure Boundary	Copper Alloy with 15% Zinc or More	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.21)	V.D2.EP-76	3.2.1-50	C

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Lube Oil Cooler) Tubes	Pressure Boundary	Copper Alloy with 15% Zinc or More	Treated Water (Internal)	Cracking	One-Time Inspection (B.2.1.21)			H, 7
					Water Chemistry (B.2.1.2)			H, 7
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	D
					Selective Leaching (B.2.1.22)	VII.F1.AP-65	3.3.1-72	A
Hoses	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-15	3.2.1-60	A
			Treated Water (Internal)	None	None	V.F.EP-29	3.2.1-60	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B, 1
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 8
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-15	3.2.1-60	A
			Lubricating Oil (Internal)	None	None	V.F.EP-16	3.2.1-60	A
			Treated Water (Internal)	None	None	V.F.EP-29	3.2.1-60	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Air - Outdoor (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.EP-103	3.2.1-7	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.EP-107	3.2.1-4	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D1.EP-80	3.2.1-50	A
					One-Time Inspection (B.2.1.21)	V.D1.EP-80	3.2.1-50	A
			Soil (External)	Cracking	Buried and Underground Piping (B.2.1.28)			H, 5
				Loss of Material	Buried and Underground Piping (B.2.1.28)	V.D2.EP-72	3.2.1-53	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 8
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
		Zinc	Air - Indoor Uncontrolled (External)	None	External Surfaces Monitoring of Mechanical Components (B.2.1.24)			F, 3
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)			F, 4
					One-Time Inspection (B.2.1.21)			F, 4
Pump Casing (Condenser Condensate Pump)	Leakage Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Condenser Condensate Pump)	Leakage Boundary	Gray Cast Iron	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
					Selective Leaching (B.2.1.22)	VII.E4.AP-31	3.3.1-72	A
Pump Casing (Condenser Vacuum Pump)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	A
Pump Casing (RCIC Pump)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
Pump Casing (Turbine Main Oil Pump)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
Pump Casing (Water Leg Pump)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Water Leg Pump)	Pressure Boundary	Carbon Steel	Treated Water (Internal)	Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
		Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-408	3.2.1-65	A
Rupture Disks	Pressure Boundary	Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-17	3.2.1-61	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-274	3.3.1-95	A
Strainer Element	Filter	Carbon Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Strainer Element	Filter	Carbon Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Carbon Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Strainer Element	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
Tanks (Turbine Lube Oil Reservoirs)	Pressure Boundary	Carbon Steel (with internal coating)	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 6
				Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	C
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	C
Tanks (Vacuum Tank)	Leakage Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	C
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	D
					Selective Leaching (B.2.1.22)	VII.E4.AP-31	3.3.1-72	C
Turbine Casings (RCIC Turbine)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	C

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.E.E-44	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Air - Outdoor (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.EP-103	3.2.1-7	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.EP-107	3.2.1-4	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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 in the Treated Water (External) environment are associated with the submerged RCIC suction strainer assemblies.

2. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect applicable to this component type, material, and environment combination. Submerged bolting for the RCIC System suction strainers in the suppression pool is visually inspected for the loss of material during each ISI inspection interval in conjunction with underwater suppression pool inspections.

3. Component is zinc casting, and in an air-indoor uncontrolled (external) environment there are no aging effects requiring management. Nonetheless, the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program is credited for ensuring the absence of any aging effects.

4. Component is zinc casting, and in a lubricating oil (internal) environment the component is susceptible to loss of material.

5. The aging effects for stainless steel components in a soil (external) environment include cracking. The Buried and Underground Piping (B.2.1.28) program will be used to manage the applicable aging effects for this component, material, and environment combination.

Table 3.2.2-3 Reactor Core Isolation Cooling System (Continued)

Plant Specific Notes: (continued)

6. The aging effects for carbon steel (with internal coating) in a lubricating oil environment include loss of coating integrity. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) is used to manage the identified aging effect applicable to carbon steel (with internal coating) in a lubricating oil environment.

7. The aging effects for copper alloy with 15% zinc or more in a treated water environment include cracking. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program are used to manage cracking for copper alloy with 15% zinc or more in a treated water environment.

8. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.2.2-4

Residual Heat Removal System

Summary of Aging Management Evaluation

Table 3.2.2-4 Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-69	3.2.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-69	3.2.1-15	A
			Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.D2.EP-73	3.2.1-17	E, 1, 2
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-122	3.2.1-15	A, 1
Flow Device	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-17	3.2.1-61	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)			G, 3
					Water Chemistry (B.2.1.2)			G, 3
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B

Table 3.2.2-4 Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Flow Device	Throttle	Nickel Alloy	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)			G, 3
					Water Chemistry (B.2.1.2)			G, 3
		Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
Heat Exchanger - (RHR Heat Exchanger) Shell Side Components	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	C
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	D
Heat Exchanger - (RHR Heat Exchanger) Tube Sheet	Pressure Boundary	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	C
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	D
Heat Exchanger - (RHR Heat Exchanger) Tubes	Heat Transfer	Stainless Steel	Treated Water (External)	Reduction of Heat Transfer	One-Time Inspection (B.2.1.21)	V.D2.EP-74	3.2.1-19	A
					Water Chemistry (B.2.1.2)	V.D2.EP-74	3.2.1-19	B
	Pressure Boundary	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	C
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	D
Hoses	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B

Table 3.2.2-4 Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-77	3.2.1-49	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B, 1
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 4
				Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-15	3.2.1-60	A
			Lubricating Oil (Internal)	None	None	V.F.EP-16	3.2.1-60	A
			Treated Water (Internal)	None	None	V.F.EP-29	3.2.1-60	A

Table 3.2.2-4 Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
Pump Casing (RHR Pump)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
Pump Casing (Water Leg Pump)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
		Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
Spray Nozzles	Spray	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A

Table 3.2.2-4 Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Spray Nozzles	Spray	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
Strainer Element	Filter	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
Valve Body	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A

Table 3.2.2-4 Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	B

Table 3.2.2-4 Residual Heat Removal System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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 in the Treated Water (External) environment are associated with the submerged RHR suction strainer assemblies.
2. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect applicable to this component type, material, and environment combination. Submerged bolting for the RHR System suction strainers in the suppression pool is visually inspected for the loss of material during each ISI inspection interval in conjunction with underwater suppression pool inspections.
3. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.21) program are used to manage the aging effect(s) applicable to this component type, material, and environment combination.
4. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.2.2-5
Standby Gas Treatment System
Summary of Aging Management Evaluation

Table 3.2.2-5 Standby Gas Treatment System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.E.EP-70	3.2.1-13	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-69	3.2.1-15	A
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
Ducting and Components	Leakage Boundary	Stainless Steel	Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	C, 1
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C
	Pressure Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-3	3.2.1-56	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-142	3.3.1-92	C
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.B.E-26	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	C

Table 3.2.2-5 Standby Gas Treatment System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Ducting and Components	Pressure Boundary	Elastomers	Air - Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.B.EP-59	3.2.1-38	A
			Condensation (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	C
		Glass	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-15	3.2.1-60	C
			Condensation (Internal)	None	None	V.F.EP-66	3.2.1-60	C
Flexible Connection	Pressure Boundary	Elastomers	Air - Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.B.EP-59	3.2.1-38	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.AP-113	3.3.1-82	A
			Condensation (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.B.E-26	3.2.1-40	A

Table 3.2.2-5 Standby Gas Treatment System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	A
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.B.E-26	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	A
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	V.B.E-26	3.2.1-40	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.E-27	3.2.1-46	A
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A

Table 3.2.2-5 Standby Gas Treatment System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Copper Alloy with 15% Zinc or More	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A

Table 3.2.2-5 Standby Gas Treatment System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The stainless steel drip pans are located internal to the ventilation ductwork, and therefore the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the applicable aging effects.

2. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is 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.

- Closed Cycle Cooling Water System (2.3.3.1)
- Combustible Gas Control System (2.3.3.2)
- Compressed Air System (2.3.3.3)
- Control Rod Drive System (2.3.3.4)
- Control Room Ventilation System (2.3.3.5)
- Cranes, Hoists and Refueling Equipment System (2.3.3.6)
- Demineralized Water Makeup System (2.3.3.7)
- Diesel Generator and Auxiliaries System (2.3.3.8)
- Drywell Pneumatic System (2.3.3.9)
- Electrical Penetration Pressurization System (2.3.3.10)
- Essential Cooling Water System (2.3.3.11)
- Fire Protection System (2.3.3.12)
- Fuel Pool Cooling and Storage System (2.3.3.13)
- Nonessential Cooling Water System (2.3.3.14)
- Nonsafety-Related Ventilation System (2.3.3.15)
- Plant Drainage System (2.3.3.16)
- Primary Containment Ventilation System (2.3.3.17)
- Process Radiation Monitoring System (2.3.3.18)
- Process Sampling and Post Accident Monitoring System (2.3.3.19)
- Radwaste System (2.3.3.20)
- Reactor Water Cleanup System (2.3.3.21)
- Safety-Related Ventilation System (2.3.3.22)
- Standby Liquid Control System (2.3.3.23)
- Suppression Pool Cleanup System (2.3.3.24)
- Traversing Incore Probe System (2.3.3.25)

3.3.2 RESULTS

The following tables summarize the results of the aging management review for Auxiliary Systems.

Table 3.3.2-1 Closed Cycle Cooling Water System - Summary of Aging Management Evaluation

Table 3.3.2-2 Combustible Gas Control System - Summary of Aging Management Evaluation

Table 3.3.2-3 Compressed Air System - Summary of Aging Management Evaluation

Table 3.3.2-4 Control Rod Drive System - Summary of Aging Management Evaluation

Table 3.3.2-5 Control Room Ventilation System - Summary of Aging Management Evaluation

Table 3.3.2-6 Cranes, Hoists and Refueling Equipment System - Summary of Aging Management Evaluation

Table 3.3.2-7 Demineralized Water Makeup System - Summary of Aging Management Evaluation

Table 3.3.2-8 Diesel Generator and Auxiliaries System - Summary of Aging Management Evaluation

Table 3.3.2-9 Drywell Pneumatic System - Summary of Aging Management Evaluation

Table 3.3.2-10 Electrical Penetration Pressurization System - Summary of Aging Management Evaluation

Table 3.3.2-11 Essential Cooling Water System - Summary of Aging Management Evaluation

Table 3.3.2-12 Fire Protection System - Summary of Aging Management Evaluation

Table 3.3.2-13 Fuel Pool Cooling and Storage System - Summary of Aging Management Evaluation

Table 3.3.2-14 Nonessential Cooling Water System - Summary of Aging Management Evaluation

Table 3.3.2-15 Nonsafety-Related Ventilation System - Summary of Aging Management Evaluation

Table 3.3.2-16 Plant Drainage System - Summary of Aging Management Evaluation

Table 3.3.2-17 Primary Containment Ventilation System - Summary of Aging Management Evaluation

3.3.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Management Programs

3.3.2.1.1 Closed Cycle Cooling Water System

Materials

The materials of construction for the Closed Cycle Cooling Water System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with less than 15% Zinc
- Glass
- Gray Cast Iron
- Stainless Steel

Environments

The Closed Cycle Cooling Water System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air/Gas - Dry
- Closed Cycle Cooling Water
- Closed Cycle Cooling Water > 140 F
- Condensation
- Lubricating Oil

Aging Effects Requiring Management

The following aging effects associated with the Closed Cycle Cooling Water System components require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Closed Cycle Cooling Water System components:

- Bolting Integrity (B.2.1.11)
- Closed Treated Water Systems (B.2.1.13)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- Selective Leaching (B.2.1.22)

3.3.2.1.2 Combustible Gas Control System

Materials

The materials of construction for the Combustible Gas Control System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass

- Stainless Steel
- Stainless Steel Bolting

Environments

The Combustible Gas Control System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Combustible Gas Control System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Combustible Gas Control System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)

3.3.2.1.3 Compressed Air System

Materials

The materials of construction for the Compressed Air System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with less than 15% Zinc

Environments

The Compressed Air System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation

Aging Effects Requiring Management

The following aging effects associated with the Compressed Air System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Compressed Air System components:

- Bolting Integrity (B.2.1.11)
- Compressed Air Monitoring (B.2.1.15)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)

3.3.2.1.4 Control Rod Drive System

Materials

The materials of construction for the Control Rod Drive System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass
- Gray Cast Iron
- Stainless Steel
- Stainless Steel Bolting

Environments

The Control Rod Drive System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation
- Lubricating Oil
- Treated Water
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Control Rod Drive System components require management:

- Cumulative Fatigue Damage
- Loss of Material

- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Control Rod Drive System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- TLAA
- Water Chemistry (B.2.1.2)

3.3.2.1.5 Control Room Ventilation System

Materials

The materials of construction for the Control Room Ventilation System components are:

- Aluminum Alloy
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Ductile Cast Iron
- Elastomers
- Galvanized Steel
- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Control Room Ventilation System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air/Gas - Dry
- Condensation

- Lubricating Oil
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Control Room Ventilation System components require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Control Room Ventilation System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)

3.3.2.1.6 Cranes, Hoists and Refueling Equipment System

Materials

The materials of construction for the Cranes, Hoists and Refueling Equipment System components are:

- Aluminum Alloy
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Stainless Steel
- Stainless Steel Bolting

Environments

The Cranes, Hoists and Refueling Equipment System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Cranes, Hoists and Refueling Equipment System components require management:

- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Cranes, Hoists and Refueling Equipment System components:

- Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)
- TLAA
- Water Chemistry (B.2.1.2)

3.3.2.1.7 Demineralized Water Makeup System

Materials

The materials of construction for the Demineralized Water Makeup System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Galvanized Steel
- Glass
- Gray Cast Iron
- Stainless Steel

Environments

The Demineralized Water Makeup System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Demineralized Water Makeup System components require management:

- Cracking
- Loss of Coating Integrity
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Demineralized Water Makeup System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- One-Time Inspection (B.2.1.21)
- Selective Leaching (B.2.1.22)
- Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)
- Water Chemistry (B.2.1.2)

3.3.2.1.8 Diesel Generator and Auxiliaries System

Materials

The materials of construction for the Diesel Generator and Auxiliaries System components are:

- Aluminum Alloy
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Ductile Cast Iron
- Elastomers
- Glass
- Gray Cast Iron
- Stainless Steel
- Stainless Steel Bolting

Environments

The Diesel Generator and Auxiliaries System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Closed Cycle Cooling Water
- Condensation
- Diesel Exhaust
- Fuel Oil
- Lubricating Oil
- Soil
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Diesel Generator and Auxiliaries System components 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 aging management programs manage the aging effects for the Diesel Generator and Auxiliaries System components:

- Bolting Integrity (B.2.1.11)
- Buried and Underground Piping (B.2.1.28)
- Closed Treated Water Systems (B.2.1.13)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Fuel Oil Chemistry (B.2.1.19)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.26)

- One-Time Inspection (B.2.1.21)
- Selective Leaching (B.2.1.22)
- TLAA

3.3.2.1.9 Drywell Pneumatic System

Materials

The materials of construction for the Drywell Pneumatic System components are:

- Aluminum Alloy
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Ductile Cast Iron
- Glass
- Gray Cast Iron
- Nickel Alloy
- Polymers
- Stainless Steel
- Stainless Steel Bolting

Environments

The Drywell Pneumatic System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air/Gas - Dry
- Closed Cycle Cooling Water
- Condensation
- Lubricating Oil
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Drywell Pneumatic System components require management:

- Change in Material Properties
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Drywell Pneumatic System components:

- Bolting Integrity (B.2.1.11)
- Closed Treated Water Systems (B.2.1.13)
- Compressed Air Monitoring (B.2.1.15)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- Selective Leaching (B.2.1.22)

3.3.2.1.10 Electrical Penetration Pressurization System

Materials

The materials of construction for the Electrical Penetration Pressurization System components are:

- Carbon Steel
- Stainless Steel

Environments

The Electrical Penetration Pressurization System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air/Gas - Dry

Aging Effect Requiring Management

The following aging effect associated with the Electrical Penetration Pressurization System components requires management:

- Loss of Material

Aging Management Program

The following aging management program manages the aging effects for the Electrical Penetration Pressurization System components:

- External Surfaces Monitoring of Mechanical Components (B.2.1.24)

3.3.2.1.11 Essential Cooling Water System

Materials

The materials of construction for the Essential Cooling Water System components are:

- Carbon Steel
- Carbon Steel (with internal coating)
- Carbon and Low Alloy Steel Bolting
- Carbon or Low Alloy Steel with Stainless Steel Cladding
- Copper Alloy with 15% Zinc or More
- Copper Alloy with 15% Zinc or More (with internal coating)
- Copper Alloy with less than 15% Zinc
- Gray Cast Iron
- Stainless Steel
- Stainless Steel Bolting

Environments

The Essential Cooling Water System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Condensation
- Lubricating Oil
- Raw Water
- Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Essential Cooling Water System components require management:

- Cracking
- Loss of Coating Integrity
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Essential Cooling Water System components:

- Bolting Integrity (B.2.1.11)
- Buried and Underground Piping (B.2.1.28)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- Open-Cycle Cooling Water System (B.2.1.12)
- Selective Leaching (B.2.1.22)
- Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)
- Water Chemistry (B.2.1.2)

3.3.2.1.12 Fire Protection System

Materials

The materials of construction for the Fire Protection System components are:

- Aluminum Silicate
- Calcium Silicate
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Ceramic Fiber
- Concrete Block
- Copper Alloy with less than 15% Zinc
- Ductile Cast Iron
- Elastomers
- Galvanized Steel
- Glass
- Gray Cast Iron
- Grout
- Gypsum
- Mineral Fiber
- Pyrocrete

- Reinforced Concrete
- Stainless Steel
- Stainless Steel Bolting

Environments

The Fire Protection System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Air/Gas - Dry
- Condensation
- Diesel Exhaust
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Fire Protection System components require management:

- Change in Material Properties
- Concrete Cracking and Spalling
- Cracking
- Cumulative Fatigue Damage
- Loss of Coating Integrity
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Fire Protection System components:

- Bolting Integrity (B.2.1.11)
- Buried and Underground Piping (B.2.1.28)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Fire Protection (B.2.1.16)
- Fire Water System (B.2.1.17)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)

- Selective Leaching (B.2.1.22)
- Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)
- Structures Monitoring (B.2.1.34)
- TLAA

3.3.2.1.13 Fuel Pool Cooling and Storage System

Materials

The materials of construction for the Fuel Pool Cooling and Storage System components are:

- Aluminum Alloy
- Boral
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass
- Rio-Tinto Alcan Composite
- Stainless Steel
- Stainless Steel Bolting

Environments

The Fuel Pool Cooling and Storage System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation
- Treated Water
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Fuel Pool Cooling and Storage System components require management:

- Loss of Material
- Loss of Preload
- Reduction of Neutron Absorbing Capacity; Change in Dimensions and Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Fuel Pool Cooling and Storage System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Monitoring of Neutron-Absorbing Materials Other Than Boraflex (B.2.1.27)
- One-Time Inspection (B.2.1.21)
- Water Chemistry (B.2.1.2)

3.3.2.1.14 Nonessential Cooling Water System

Materials

The materials of construction for the Nonessential Cooling Water System components are:

- Aluminum Alloy
- Carbon Steel
- Carbon steel (with external coating)
- Carbon Steel (with internal coating)
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with less than 15% Zinc
- Gray Cast Iron
- Stainless Steel

Environments

The Nonessential Cooling Water System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Air/Gas - Dry
- Concrete
- Condensation
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Nonessential Cooling Water System components require management:

- Cracking
- Loss of Coating Integrity
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Nonessential Cooling Water System components:

- Bolting Integrity (B.2.1.11)
- Buried and Underground Piping (B.2.1.28)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Open-Cycle Cooling Water System (B.2.1.12)
- Selective Leaching (B.2.1.22)
- Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)

3.3.2.1.15 Nonsafety-Related Ventilation System

Materials

The materials of construction for the Nonsafety-Related Ventilation System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with less than 15% Zinc
- Ductile Cast Iron
- Glass
- Stainless Steel

Environments

The Nonsafety-Related Ventilation System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air/Gas - Dry
- Closed Cycle Cooling Water

- Condensation

Aging Effects Requiring Management

The following aging effects associated with the Nonsafety-Related Ventilation System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Nonsafety-Related Ventilation System components:

- Bolting Integrity (B.2.1.11)
- Closed Treated Water Systems (B.2.1.13)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)

3.3.2.1.16 Plant Drainage System

Materials

The materials of construction for the Plant Drainage System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with less than 15% Zinc
- Ductile Cast Iron
- Galvanized Steel
- Glass
- Polymers
- Stainless Steel

Environments

The Plant Drainage System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Concrete
- Condensation
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Plant Drainage System components require management:

- Loss of Coating Integrity
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Plant Drainage System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)

3.3.2.1.17 Primary Containment Ventilation System

Materials

The materials of construction for the Primary Containment Ventilation System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Gray Cast Iron
- Stainless Steel

Environments

The Primary Containment Ventilation System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air/Gas - Dry
- Closed Cycle Cooling Water
- Condensation
- Lubricating Oil

- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Primary Containment Ventilation System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Primary Containment Ventilation System components:

- Bolting Integrity (B.2.1.11)
- Closed Treated Water Systems (B.2.1.13)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.26)
- One-Time Inspection (B.2.1.21)
- Selective Leaching (B.2.1.22)

3.3.2.1.18 Process Radiation Monitoring System

Materials

The materials of construction for the Process Radiation Monitoring System components are:

- Aluminum Alloy
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with less than 15% Zinc
- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Process Radiation Monitoring System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Closed Cycle Cooling Water

- Condensation
- Raw Water
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Process Radiation Monitoring System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Process Radiation Monitoring System components:

- Bolting Integrity (B.2.1.11)
- Closed Treated Water Systems (B.2.1.13)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Open-Cycle Cooling Water System (B.2.1.12)

3.3.2.1.19 Process Sampling and Post Accident Monitoring System

Materials

The materials of construction for the Process Sampling and Post Accident Monitoring System components are:

- Aluminum Alloy
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Carbon or Low Alloy Steel with Stainless Steel Cladding
- Copper Alloy with 15% Zinc or More
- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Process Sampling and Post Accident Monitoring System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air/Gas - Dry
- Closed Cycle Cooling Water
- Condensation
- Treated Water
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Process Sampling and Post Accident Monitoring System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Process Sampling and Post Accident Monitoring System components:

- Bolting Integrity (B.2.1.11)
- Closed Treated Water Systems (B.2.1.13)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- One-Time Inspection (B.2.1.21)
- Selective Leaching (B.2.1.22)
- Water Chemistry (B.2.1.2)

3.3.2.1.20 Radwaste System

Materials

The materials of construction for the Radwaste System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Ductile Cast Iron
- Stainless Steel

- Stainless Steel Bolting

Environments

The Radwaste System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Radwaste System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Radwaste System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- One-Time Inspection (B.2.1.21)
- Water Chemistry (B.2.1.2)

3.3.2.1.21 Reactor Water Cleanup System

Materials

The materials of construction for the Reactor Water Cleanup System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Carbon or Low Alloy Steel with Stainless Steel Cladding
- Glass
- Stainless Steel

Environments

The Reactor Water Cleanup System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Treated Water
- Treated Water > 140 F

Aging Effects Requiring Management

The following aging effects associated with the Reactor Water Cleanup System components require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Water Cleanup System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Flow-Accelerated Corrosion (B.2.1.10)
- One-Time Inspection (B.2.1.21)
- TLAA
- Water Chemistry (B.2.1.2)

3.3.2.1.22 Safety-Related Ventilation System

Materials

The materials of construction for the Safety-Related Ventilation System components are:

- Aluminum Alloy
- Carbon Steel
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Elastomers
- Galvanized Steel

- Stainless Steel

Environments

The Safety-Related Ventilation System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Safety-Related Ventilation System components require management:

- Hardening and Loss of Strength
- Loss of Material
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Safety-Related Ventilation System components:

- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)

3.3.2.1.23 Standby Liquid Control System

Materials

The materials of construction for the Standby Liquid Control System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with 15% Zinc or More
- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Standby Liquid Control System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation
- Sodium Pentaborate Solution
- Treated Water
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Standby Liquid Control System components require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Standby Liquid Control System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- One-Time Inspection (B.2.1.21)
- Selective Leaching (B.2.1.22)
- Water Chemistry (B.2.1.2)

3.3.2.1.24 Suppression Pool Cleanup System

Materials

The materials of construction for the Suppression Pool Cleanup System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Gray Cast Iron
- Stainless Steel

Environments

The Suppression Pool Cleanup System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Suppression Pool Cleanup System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Suppression Pool Cleanup System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- One-Time Inspection (B.2.1.21)
- Selective Leaching (B.2.1.22)
- Water Chemistry (B.2.1.2)

3.3.2.1.25 Traversing Incore Probe System

Materials

The materials of construction for the Traversing Incore Probe System components are:

- Stainless Steel

Environments

The Traversing Incore Probe System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation

Aging Effect Requiring Management

The following aging effect associated with the Traversing Incore Probe System components requires management:

- Loss of Material

Aging Management Programs

The following aging management program manages the aging effects for the Traversing Incore Probe System components:

- Compressed Air Monitoring (B.2.1.15)

3.3.2.2 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. For the Auxiliary Systems, those programs are addressed in the following subsections.

3.3.2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of metal fatigue as a TLAA for the Feedwater System, High Pressure Core Spray System, Reactor Coolant Pressure Boundary System, Reactor Core Isolation Cooling System, and Reactor Water Cleanup System is discussed in Section 4.3. The evaluation of crane load cycles as a TLAA for the Cranes, Hoists and Refueling Equipment System is discussed in Section 4.7.

3.3.2.2.2 Cracking due to Stress Corrosion Cracking and Cyclic Loading

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 manages 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.

Item Number 3.3.1-3 is applicable to PWRs only and is not used for LSCS.

3.3.2.2.3 Cracking due to Stress Corrosion Cracking

Cracking due to stress corrosion cracking could occur for stainless steel piping, piping components, piping elements and tanks exposed to outdoor air. The possibility of cracking also extends to components exposed to air which has recently been introduced into buildings, i.e., components near intake vents. Cracking is only known to occur in environments containing sufficient halides (primarily chlorides) and in which condensation or deliquescence is possible. Condensation or deliquescence should generally be assumed to be possible. Applicable outdoor air environments (and associated indoor air environments) include, but are not limited to, those within approximately 5 miles of a saltwater coastline, those within 1/2 mile of a highway which *is treated with salt in the wintertime, those areas in which the soil contains more than trace chlorides, those plants having cooling towers where the water is treated with chlorine or chlorine compounds, and those areas subject to chloride contamination from other agricultural or industrial sources. This item is applicable for the environments described above.*

GALL AMP XI.M36, "External Surfaces Monitoring," is an acceptable method to manage the aging effect. The applicant may demonstrate that this item is not applicable by describing the outdoor air environment present at the plant and demonstrating that external chloride stress corrosion cracking is not expected. The GALL Report recommends further evaluation to determine whether an adequate aging management program is used to manage this aging effect based on the environmental conditions applicable to the plant and ASME Code Section XI requirements applicable to the components.

LSCS will implement the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program to manage cracking due to stress corrosion cracking in stainless steel piping, piping components, and piping elements exposed to outdoor air in the Diesel Generator and Auxiliaries System. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program provides for management of aging effects through periodic visual inspection of external surfaces for evidence of cracking. Any visible evidence of cracking will be evaluated for acceptability of continued service. Deficiencies will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program is described in Appendix B.

3.3.2.2.4 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 (Appendix A.1 of this SRP-LR).

Item Number 3.3.1-5 is applicable to PWRs only and is not used for LSCS.

3.3.2.2.5 Loss of Material due to Pitting and Crevice Corrosion

Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air. The possibility of pitting and crevice corrosion also extends to components exposed to air which has recently been introduced into buildings, i.e., components near intake vents. Pitting and crevice corrosion is only known to occur in environments containing sufficient halides (primarily chlorides) and in which condensation or deliquescence is possible. Condensation or deliquescence should generally be assumed to be possible. Applicable outdoor air environments (and associated indoor air environments) include, but are not limited to, those within approximately 5 miles of a saltwater coastline, those within 1/2 *mile of a highway which is treated with salt in the wintertime, those areas in which the soil contains more than trace chlorides, those plants having cooling towers where the water is treated with chlorine or chlorine compounds, and those areas subject to chloride contamination from other agricultural or industrial sources. This item is applicable for the environments described above.*

GALL AMP XI.M36, "External Surfaces Monitoring," is an acceptable method to manage the aging effect. The applicant may demonstrate that this item is not applicable by describing the outdoor air environment present at the plant and demonstrating that external pitting or crevice corrosion is not expected. The GALL Report recommends further evaluation to determine whether an adequate aging management program is used to manage this aging effect based on the environmental conditions applicable to the plant and ASME Code Section XI requirements Quality Assurance for Aging Management of Nonsafety-Related Components.

LSCS will implement the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program to manage the loss of material due to pitting and crevice corrosion in stainless steel piping, piping components, and piping elements exposed to outdoor air in the Diesel Generator and Auxiliaries System. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program provides for management of aging effects through periodic visual inspection of external surfaces for evidence of the loss of material. Any visible evidence of the loss of material will be evaluated for acceptability of continued service. Deficiencies will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program is described in Appendix B.

3.3.2.2.6 Quality Assurance for Aging Management of Nonsafety-Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.3.2.2.7 Ongoing Review of Operating Experience

Ongoing review of operating experience is addressed in Appendix A, Section A.1.6 and Appendix B, Section B.1.4.

3.3.2.2.8 Loss of Material due to Recurring Internal Corrosion

Recurring internal corrosion can result in the need to augment AMPs beyond the recommendations in the GALL Report. During the search of plant-specific OE conducted during the LRA development, recurring internal corrosion can be identified by the number of occurrences of aging effects and the extent of degradation at each localized corrosion site. This further evaluation item is applicable if the search of plant-specific OE reveals repetitive occurrences (e.g., one per refueling outage cycle that has occurred over: (a) three or more sequential or nonsequential cycles for a 10-year OE search, or (b) two or more sequential or nonsequential cycles for a 5-year OE search) of aging effects with the same aging mechanism in which the aging effect resulted in the component either not meeting plant-specific acceptance criteria or experiencing a reduction in wall thickness greater than 50 percent (regardless of the minimum wall thickness.)

The GALL Report recommends that a plant-specific AMP, or a new or existing AMP, be evaluated for inclusion of augmented requirements to ensure the adequate management of any recurring aging effect(s). Potential augmented requirements include: alternative examination methods (e.g., volumetric versus external visual), augmented inspections (e.g., a greater number of locations, additional locations based on risk insights based on susceptibility to aging effect and consequences of failure, a greater frequency of inspections), and additional trending parameters and decision points where increased inspections would be implemented. Acceptance criteria are described in Appendix A.1, "Aging Management Review – Generic (Branch Technical Position RSLB-1)."

The applicant states: (a) why the program's examination methods will be sufficient to detect the recurring aging effect before affecting the ability of a component to perform its intended function, (b) the basis for the adequacy of augmented or lack of augmented inspections, (c) what parameters will be trended as well as the decision points where increased inspections would be implemented (e.g., the extent of degradation at individual corrosion sites, the rate of degradation change), (d) how inspections of components that are not easily accessed (i.e., buried, underground) will be conducted, and (e) how leaks in any involved buried or underground components will be identified.

Each plant-specific operating experience example should be evaluated to determine if the chosen AMP should be augmented even if the thresholds for significance of aging effect or frequency of occurrence of aging effect have not been exceeded. For example, during a 10-year search of plant specific operating experience, two instances of 360 degree 30 percent wall loss occurred at copper alloy to steel joints. Neither the significance of the aging effect nor the frequency of occurrence of aging effect threshold has been exceeded. Nevertheless, the operating experience should be evaluated to determine if the AMP that is proposed to manage the aging effect is sufficient (e.g., method of inspection, frequency of inspection, number of inspections) to provide reasonable assurance that the CLB intended functions of the component will be met throughout the period of extended operation. Likewise, the GALL Report AMR items associated with the new FE items only cite raw water and waste water environments because OE indicates that these are the predominant environments associated with recurring internal corrosion; however, if the search of plant-specific OE reveals recurring internal corrosion in other water environments (e.g., treated water), the aging effect should be addressed in a similar manner.

LR-ISG-2012-02 has been issued which addresses instances of recurring internal corrosion identified during review of plant-specific operating experience. The operating experience for LSCS has been reviewed and instances of internal corrosion in the Essential Cooling Water System, Nonessential Cooling Water System, Fire Protection System, and Plant Drainage System have been identified with a frequency that is consistent with the thresholds discussed in LR-ISG-2012-02.

LSCS will implement the following inspections:

1. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage the loss of material due to recurring internal corrosion in above-ground and buried carbon steel piping exposed to raw water in the Essential Cooling Water System and Nonessential Cooling Water System. A minimum of ten (10) MIC degradation

inspections in aboveground Essential Cooling Water System piping and a minimum of ten (10) MIC degradation inspections in aboveground Nonessential Cooling Water System piping will be performed every 24 months until the frequency of MIC occurrences no longer meets the criteria for recurring internal corrosion. These inspections supplement those that are being performed to implement the requirements of GL 89-13. A portion of these inspection locations will be selected with process conditions similar (e.g. flow, temperature) to those in buried portions of the piping to provide sufficient understanding of the condition of the buried piping.

2. The Fire Water System (B.2.1.17) program will be used to manage the loss of material due to recurring internal corrosion in above-ground and buried carbon steel piping exposed to raw water in the Fire Protection System. Inspections will be performed at five locations in aboveground piping susceptible to MIC every year until the frequency of MIC occurrences no longer meets the criteria for recurring internal corrosion. A portion of these inspection locations will be selected with process conditions similar (e. g. flow, temperature) to those in buried portions of the piping to provide sufficient understanding of the condition of the buried piping.

3. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage the loss of material due to recurring internal corrosion in above-ground carbon steel and galvanized steel piping exposed to waste water in the Plant Drainage System. Ten different locations will be inspected during each ten-year inspection period of this program. Inspections will continue until the frequency of occurrences no longer meets the criteria for recurring internal corrosion.

The inspections may consist of direct visual inspection, or wall thickness measurements using UT or other suitable techniques. Where ultrasonic examinations are performed, the examination will consist of a full circumferential ultrasonic thickness scan in the area at a minimum of three inches on either side of the location of interest. The entire boundary of any area found thinned is recorded, even if it extends beyond the original specified examination area. When inspections identify multiple corrosion sites, they are reviewed to determine if they may be evaluated as separate flaws to assess the structural integrity of the piping. The selected inspection locations will be periodically reviewed to validate their relevance and usefulness and adjusted as appropriate. Evaluation of the inspection results will include (1) a comparison to the nominal wall thickness or previous wall thickness measurements to determine rate of corrosion degradation, (2) a comparison to the design minimum allowable wall thickness to determine the acceptability of the component for continued use, and (3) a determination of reinspection interval. Additional locations will be examined if these examinations or plant operating experience identify significant degradation. Where the degradation is identified in ASME Section III portions of piping, the applicable ASME Section III requirements for augmented examinations will be utilized. Where the degradation is identified in non-ASME Section III portions of piping, the following supplemental inspection criteria will be used. For through-wall leaks and material loss greater than 50 percent of nominal wall, four additional locations will be examined. Where the identified material loss is 30 percent to 50 percent of nominal wall thickness and the calculated remaining life is less than two years, two additional locations will be examined. For the Essential Cooling Water system, an operability evaluation is performed for degraded conditions that involve system leakage or the measured remaining pipe wall thickness is less than design thickness. The operability evaluation includes reviews for loss of flow, water spraying on surrounding SSC, flooding, and potential for flaw propagation. Based on the operability evaluation, any appropriate compensatory actions are identified and implemented until such time as repair or replacement is completed.

Deficiencies will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The Open-Cycle Cooling Water System (B.2.1.12) program, Fire Water System (B.2.1.17) program, and Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program are described in Appendix B.

3.3.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Auxiliary Systems components:

- Section 4.3, Metal Fatigue Analyses
- Section 4.7, Other Plant-Specific Time-Limited Aging Analysis

3.3.3 CONCLUSION

The Auxiliary Systems piping, fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Auxiliary Systems components are identified in the summaries in Section 3.3.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Auxiliary Systems components will be adequately managed so that there is reasonable assurance that the intended functions are maintained consistent with the current licensing basis during 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 due to fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for structural girders of cranes that fall within the scope of 10 CFR 54 (Standard Review Plan, Section 4.7, “Other Plant-Specific Time-Limited Aging Analyses,” 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	Stainless steel, Steel Heat exchanger components and tubes, Piping, piping components, and piping elements exposed to Treated borated water, Air - indoor, uncontrolled, Treated water	Cumulative fatigue damage due to fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the SRP, Section 4.3 “Metal Fatigue,” for acceptable methods 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.
3.3.1-3	PWR 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**
3.3.1-4	Stainless steel Piping, piping components, and piping elements; tanks exposed to Air – outdoor	Cracking due to stress corrosion cracking	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage cracking of stainless steel piping, piping components, and piping elements exposed to air - outdoor in the Diesel Generator and Auxiliaries System. See subsection 3.3.2.2.3.
3.3.1-5	PWR Only				
3.3.1-6	Stainless steel Piping, piping components, and piping elements; tanks exposed to Air – outdoor	Loss of material due to pitting and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of stainless steel piping, piping components, and piping elements exposed to air - outdoor in the Diesel Generator and Auxiliaries System. See subsection 3.3.2.2.5.
3.3.1-7	PWR Only				
3.3.1-8	PWR 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
3.3.1-9	PWR Only				
3.3.1-10	Steel, high-strength Closure bolting exposed to Air with steam or water leakage	Cracking due to stress corrosion cracking; cyclic loading	Chapter XI.M18, "Bolting Integrity"	No	Not Applicable. There is no steel, high-strength closure bolting exposed to air with steam or water leakage in Auxiliary Systems.
3.3.1-11	Steel, high-strength High-pressure pump, closure bolting exposed to Air with steam or water leakage	Cracking due to stress corrosion cracking; cyclic loading	Chapter XI.M18, "Bolting Integrity"	No	Not Applicable. There is no steel, high-strength high-pressure pump, closure bolting exposed to air with steam or water leakage in Auxiliary 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
3.3.1-12	Steel; stainless steel Closure bolting, Bolting exposed to Condensation, Air – indoor, uncontrolled (External), Air – outdoor (External)	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage loss of material of carbon and low alloy steel bolting and stainless steel bolting exposed to air - indoor uncontrolled in the Closed Cycle Cooling Water System, Combustible Gas Control System, Compressed Air System, Control Rod Drive System, Control Room Ventilation System, Demineralized Water Makeup System, Diesel Generator and Auxiliaries System, Drywell Pneumatic System, Essential Cooling Water System, Fire Protection System, Fuel Pool Cooling and Storage System, Nonessential Cooling Water System, Nonsafety-Related Ventilation System, Plant Drainage System, Primary Containment Ventilation System, Process Radiation Monitoring System, Process Sampling and Post Accident Monitoring System, Radwaste System, Reactor Water Cleanup System, Standby Liquid Control System, and Suppression Pool Cleanup System.
3.3.1-13	Steel Closure bolting exposed to Air with steam or water leakage	Loss of material due to general corrosion	Chapter XI.M18, "Bolting Integrity"	No	Not Applicable. There is no steel closure bolting exposed to air with steam or water leakage in Auxiliary 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
3.3.1-14	Steel, Stainless Steel Bolting exposed to Soil	Loss of preload	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage loss of preload of the carbon and low alloy steel bolting exposed to soil in the Fire Protection System.
3.3.1-15	Steel; stainless steel, Copper alloy, Nickel alloy, Stainless steel Closure bolting, Bolting exposed to Air – indoor, uncontrolled (External), Any environment, Air – outdoor (External), Raw water, Treated borated water, Fuel oil, Treated water	Loss of preload due to thermal effects, gasket creep, and self-loosening	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage loss of preload of carbon and low alloy steel bolting and stainless steel bolting exposed to air - indoor uncontrolled and raw water in the Closed Cycle Cooling Water System, Combustible Gas Control System, Compressed Air System, Control Rod Drive System, Control Room Ventilation System, Demineralized Water Makeup System, Diesel Generator and Auxiliaries System, Drywell Pneumatic System, Essential Cooling Water System, Fire Protection System, Fuel Pool Cooling and Storage System, Nonessential Cooling Water System, Nonsafety-Related Ventilation System, Plant Drainage System, Primary Containment Ventilation System, Process Radiation Monitoring System, Process Sampling and Post Accident Monitoring System, Radwaste System, Reactor Water Cleanup System, Standby Liquid Control System, and Suppression Pool Cleanup 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
3.3.1-16	Stainless steel Piping, piping components, and piping elements exposed to Treated water >60°C (>140°F)	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M2, "Water Chemistry," and Chapter XI.M25, "BWR Reactor Water Cleanup System"	No	Not Applicable. The main process piping in the LSCS Reactor Water Cleanup (RWCU) System is carbon steel. There are no stainless steel piping, piping components, and piping elements ≥ 4 inch NPS exposed to treated water >60°C (>140°F). Therefore, LSCS does not use the Chapter XI.M25, "BWR Reactor Water Cleanup System" program to manage cracking. Cracking in RWCU System stainless steel piping, piping components, and piping elements < 4 inch NPS exposed to treated water >60°C (>140°F) is addressed in 3.3.1-19.
3.3.1-17	Stainless steel Heat exchanger tubes exposed to Treated water, Treated borated water	Reduction of heat transfer due to fouling	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Not Applicable. There are no stainless steel heat exchanger tubes exposed to treated water or treated borated water in Auxiliary 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
3.3.1-18	Stainless steel High-pressure pump, casing, Piping, piping components, and piping elements exposed to Treated borated water >60°C (>140°F), Sodium pentaborate solution >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Not Applicable. There are no stainless steel high-pressure pump, casing, piping, piping components, and piping elements exposed to treated borated water >60°C (>140°F) or sodium pentaborate solution >60°C (>140°F) in Auxiliary Systems.
3.3.1-19	Stainless steel Regenerative heat exchanger components exposed to Treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of the carbon or low alloy steel with stainless steel cladding and stainless steel regenerative heat exchanger components, piping, piping components, and piping elements exposed to treated water > 140°F in the Reactor Water Cleanup System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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
3.3.1-20	Stainless steel, Stainless steel; steel with stainless steel cladding Heat exchanger components exposed to Treated borated water >60°C (>140°F), Treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of the carbon or low alloy steel with stainless steel cladding and stainless steel non-regenerative heat exchanger components exposed to treated water > 140°F in the Reactor Water Cleanup System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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
3.3.1-21	Steel Piping, piping components, and piping elements exposed to Treated water	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of carbon steel, ductile cast iron, and gray cast iron accumulator, heat exchanger components, piping, piping components, and piping elements, and tanks exposed to treated water in the Control Rod Drive System, Demineralized Water Makeup System, Fuel Pool Cooling and Storage System, Process Sampling and Post Accident Monitoring System, Radwaste System, Reactor Water Cleanup System, and Suppression Pool Cleanup System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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
3.3.1-22	Copper alloy Piping, piping components, and piping elements exposed to Treated water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of copper alloy with 15% zinc or more and copper alloy with less than 15% zinc piping, piping components, and piping elements exposed to treated water in the Demineralized Water Makeup System and Standby Liquid Control System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.3.1-23	Aluminum Piping, piping components, and piping elements exposed to Treated water	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Not Applicable. The loss of material in aluminum piping, piping components, and piping elements exposed to treated water is addressed in 3.3.1-25.
3.3.1-24	Aluminum Piping, piping components, and piping elements exposed to Treated water	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Not Applicable. The loss of material in aluminum piping, piping components, and piping elements exposed to treated water is addressed in 3.3.1-25.

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
3.3.1-25	Stainless steel, Stainless steel; steel with stainless steel cladding, Aluminum Piping, piping components, and piping elements, Heat exchanger components exposed to Treated water, Sodium pentaborate solution	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of aluminum, aluminum alloy, carbon or low alloy steel with stainless steel cladding, and stainless steel crane/hoist (fuel prep machine), heat exchanger components, miscellaneous steel, piping, piping components, and piping elements, and tanks exposed to sodium pentaborate solution, treated water, and treated water > 140°F in the Control Rod Drive System, Cranes, Hoists and Refueling Equipment System, Essential Cooling Water System, Fuel Pool Cooling and Storage System, Process Sampling and Post Accident Monitoring System, Radwaste System, Reactor Water Cleanup System, Standby Liquid Control System, Suppression Pool Cleanup System, and Structural Commodity Group. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.

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
3.3.1-26	Steel (with elastomer lining), Steel (with elastomer lining or stainless steel cladding) Piping, piping components, and piping elements exposed to Treated water	Loss of material due to pitting and crevice corrosion (only for steel after lining/cladding degradation)	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Not Applicable. There are no steel (with elastomer lining) piping, piping components, and piping elements exposed to treated water in Auxiliary Systems. The loss of material in steel (with stainless steel cladding) piping, piping components, and piping elements exposed to treated water is addressed in 3.3.1-25.
3.3.1-27	Stainless steel Heat exchanger tubes exposed to Treated water	Reduction of heat transfer due to fouling	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage reduction of heat transfer of stainless steel heat exchanger tubes exposed to treated water in the Essential Cooling Water System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.3.1-28	PWR Only				
3.3.1-29	PWR 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
3.3.1-30	Concrete; cementitious material Piping, piping components, and piping elements exposed to Raw Water	Changes in material properties due to aggressive chemical attack	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no concrete; cementitious material piping, piping components, and piping elements exposed to raw water in Auxiliary Systems.
3.3.1-30x	Fiberglass, HDPE Piping, piping components, and piping elements exposed to Raw water (internal)	Cracking, blistering, change in color due to water absorption	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no fiberglass, HDPE piping, piping components, and piping elements exposed to raw water in Auxiliary Systems.
3.3.1-31	Concrete; cementitious material Piping, piping components, and piping elements exposed to Raw Water	Cracking due to settling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no concrete; cementitious material piping, piping components, and piping elements exposed to raw water in Auxiliary Systems.
3.3.1-32	Reinforced concrete, asbestos cement Piping, piping components, and piping elements exposed to Raw water	Cracking due to aggressive chemical attack and leaching; Changes in material properties due to aggressive chemical attack	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no reinforced concrete, asbestos cement piping, piping components, and piping elements exposed to raw water in Auxiliary 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
3.3.1-32x	Elastomer seals and components exposed to raw water	Hardening and loss of strength due to elastomer degradation; loss of material due to erosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no elastomer seals and components exposed to raw water in Auxiliary Systems.
3.3.1-33	Concrete; cementitious material Piping, piping components, and piping elements exposed to Raw Water	Loss of material due to abrasion, cavitation, aggressive chemical attack, and leaching	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no concrete; cementitious material piping, piping components, and piping elements exposed to raw water in Auxiliary Systems.
3.3.1-34	Nickel alloy, Copper alloy Piping, piping components, and piping elements exposed to Raw water	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no nickel alloy piping, piping components, and piping elements exposed to raw water in Auxiliary Systems. The loss of material in copper alloy piping, piping components, and piping elements exposed to raw water is addressed in 3.3.1-36.
3.3.1-35	Copper alloy Piping, piping components, and piping elements exposed to Raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. The loss of material in copper alloy piping, piping components, and piping elements exposed to raw water is addressed in 3.3.1-36.

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
3.3.1-36	Copper alloy Piping, piping components, and piping elements exposed to Raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion; fouling that leads to corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage loss of material of copper alloy with less than 15% zinc piping, piping components, and piping elements exposed to raw water in the Nonessential Cooling Water System and Process Radiation Monitoring System.
3.3.1-37	Steel (with coating or lining) Piping, piping components, and piping elements exposed to Raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion; fouling that leads to corrosion; lining/coating degradation	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage loss of material of carbon steel (with internal coating) and carbon steel (with external coating) heat exchanger components, piping, piping components, and piping elements, and traveling water screen framework exposed to raw water in the Essential Cooling Water System and Nonessential Cooling Water System. The loss of coating integrity in carbon steel (with internal coating) and carbon steel (with external coating) heat exchanger components, piping, piping components, and piping elements, and traveling water screen framework is managed by the Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) plant-specific 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
3.3.1-38	Copper alloy, Steel Heat exchanger components exposed to Raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologically-influenced corrosion; fouling that leads to corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage loss of material of carbon steel, copper alloy with 15% zinc or more, copper alloy with 15% zinc or more (with internal coating), copper alloy with less than 15% zinc, and gray cast iron traveling water screen framework, heat exchanger components, piping, piping components, and piping elements exposed to raw water in the Essential Cooling Water System and Nonessential Cooling Water System.
3.3.1-39	Stainless steel Piping, piping components, and piping elements exposed to Raw water	Loss of material due to pitting and crevice corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. The loss of material in stainless steel piping, piping components, and piping elements exposed to raw water is addressed in 3.3.1-40.

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
3.3.1-40	Stainless steel Piping, piping components, and piping elements exposed to Raw water	Loss of material due to pitting and crevice corrosion; fouling that leads to corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage loss of material of carbon or low alloy steel with stainless steel cladding and stainless steel fish barrier, heat exchanger components, piping, piping components, and piping elements in the Essential Cooling Water System, Nonessential Cooling Water System, and Process Radiation Monitoring System.
3.3.1-41	Stainless steel Piping, piping components, and piping elements exposed to Raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program has been substituted and will be used to manage the loss of material in stainless steel concrete anchors exposed to raw water in the Lake Screen House.
3.3.1-42	Copper alloy, Titanium, Stainless steel Heat exchanger tubes exposed to Raw water	Reduction of heat transfer due to fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage reduction of heat transfer of the copper alloy with 15% zinc or more, copper alloy with less than 15% zinc, and stainless steel heat exchanger tubes exposed to raw water in the Essential Cooling Water 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
3.3.1-43	Stainless steel Piping, piping components, and piping elements exposed to Closed-cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. The Closed Treated Water Systems (B.2.1.13) program will be used to manage cracking of stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water > 140°F in the Closed Cycle Cooling Water System.
3.3.1-44	Stainless steel; steel with stainless steel cladding Heat exchanger components exposed to Closed-cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. The Closed Treated Water Systems (B.2.1.13) program will be used to manage cracking of stainless steel heat exchanger components exposed to closed cycle cooling water > 140°F in the Closed Cycle Cooling Water System.
3.3.1-45	Steel Piping, piping components, and piping elements; tanks exposed to Closed-cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. The Closed Treated Water Systems (B.2.1.13) program will be used to manage loss of material of carbon steel, ductile cast iron, and gray cast iron piping, piping components, and piping elements and tanks exposed to closed cycle cooling water in the Closed Cycle Cooling Water System, Diesel Generator and Auxiliaries System, Drywell Pneumatic System, Nonsafety-Related Ventilation System, Primary Containment Ventilation System, and Process Sampling and Post Accident Monitoring 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**
3.3.1-46	Steel, Copper alloy Heat exchanger components, Piping, piping components, and piping elements exposed to Closed-cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. The Closed Treated Water Systems (B.2.1.13) program will be used to manage loss of material of carbon steel, copper alloy with 15% zinc or more, copper alloy with less than 15% zinc, and gray cast iron heat exchanger components, piping, piping components, and piping elements exposed to closed cycle cooling water in the Closed Cycle Cooling Water System, Diesel Generator and Auxiliaries System, Nonsafety-Related Ventilation System, Primary Containment Ventilation System, and Process Radiation Monitoring System.
3.3.1-47	Stainless steel; steel with stainless steel cladding Heat exchanger components exposed to Closed-cycle cooling water	Loss of material due to microbiologically-influenced corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not applicable. Microbiologically-influenced corrosion is not a predicted aging mechanism for the loss of material in the closed cycle cooling water environment. The loss of material in stainless steel heat exchanger components exposed to closed cycle cooling water is addressed in Item Number 3.3.1-49.
3.3.1-48	Aluminum Piping, piping components, and piping elements exposed to Closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no aluminum piping, piping components, and piping elements exposed to closed-cycle cooling water in Auxiliary 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
3.3.1-49	Stainless steel Piping, piping components, and piping elements exposed to Closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. The Closed Treated Water Systems (B.2.1.13) program will be used to manage loss of material of stainless steel heat exchanger components, piping, piping components, and piping elements exposed to closed cycle cooling water and closed cycle cooling water > 140°F in the Closed Cycle Cooling Water System, Diesel Generator and Auxiliaries System, Nonsafety-Related Ventilation System, Primary Containment Ventilation System, Process Radiation Monitoring System, and Process Sampling and Post Accident Monitoring System.
3.3.1-50	Stainless steel, Copper Alloy, Steel Heat exchanger tubes exposed to Closed-cycle cooling water	Reduction of heat transfer due to fouling	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. The Closed Treated Water Systems (B.2.1.13) program will be used to manage reduction of heat transfer of copper alloy with 15% zinc or more heat exchanger tubes exposed to closed cycle cooling water in the Diesel Generator and Auxiliaries System.
3.3.1-51	Boraflex Spent fuel storage racks: neutron-absorbing sheets (PWR), Spent fuel storage racks: neutron-absorbing sheets (BWR) exposed to Treated borated water, Treated water	Reduction of neutron-absorbing capacity due to boraflex degradation	Chapter XI.M22, “Boraflex Monitoring”	No	Not applicable. LSCS does not use Boraflex for neutron absorption in the spent fuel storage racks. The LSCS spent fuel storage racks use boral and rio-tinto alcan composite for neutron absorption. The reduction in neutron absorbing capacity for boral and rio-tinto alcan composite is addressed in Item Number 3.3.1-102.

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**
3.3.1-52	Steel Cranes: rails and structural girders exposed to Air – indoor, uncontrolled (External)	Loss of material due to general corrosion	Chapter XI.M23, “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems”	No	Consistent with NUREG-1801. The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14) program will be used to manage loss of material of carbon steel crane/hoist components exposed to air - indoor uncontrolled in the Cranes, Hoists and Refueling Equipment System.
3.3.1-53	Steel Cranes - rails exposed to Air – indoor, uncontrolled (External)	Loss of material due to wear	Chapter XI.M23, “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems”	No	Consistent with NUREG-1801. The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14) program will be used to manage loss of material of carbon steel crane/hoist components exposed to air - indoor uncontrolled in the Cranes, Hoists and Refueling Equipment System.
3.3.1-54	Copper alloy Piping, piping components, and piping elements exposed to Condensation	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M24, “Compressed Air Monitoring"	No	Consistent with NUREG-1801. The Compressed Air Monitoring (B.2.1.15) program will be used to manage loss of material of the copper alloy piping, piping components, and piping elements exposed to condensation in the Compressed Air 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
3.3.1-55	Steel Piping, piping components, and piping elements: compressed air system exposed to Condensation (Internal)	Loss of material due to general and pitting corrosion	Chapter XI.M24, “Compressed Air Monitoring”	No	Consistent with NUREG-1801 with exceptions. The Compressed Air Monitoring (B.2.1.15) program will be used to manage loss of material of carbon steel piping, piping components, and piping elements exposed to condensation in the Compressed Air System. An exception applies to the NUREG-1801 recommendations for Compressed Air Monitoring (B.2.1.15) program implementation.
3.3.1-56	Stainless steel Piping, piping components, and piping elements exposed to Condensation (Internal)	Loss of material due to pitting and crevice corrosion	Chapter XI.M24, “Compressed Air Monitoring”	No	Consistent with NUREG-1801 with exceptions. The Compressed Air Monitoring (B.2.1.15) program will be used to manage loss of material of stainless steel accumulators, piping, piping components, and piping elements exposed to condensation in the Drywell Pneumatic System and Traversing Incore Probe System. An exception applies to the NUREG-1801 recommendations for Compressed Air Monitoring (B.2.1.15) program implementation.

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
3.3.1-57	Elastomers Fire barrier penetration seals exposed to Air - indoor, uncontrolled, Air – outdoor	Increased hardness; shrinkage; loss of strength due to weathering	Chapter XI.M26, "Fire Protection"	No	Consistent with NUREG-1801. The Fire Protection (B.2.1.16) program will be used to manage change in material properties of elastomers fire barriers (penetration seals and fire stops) exposed to air - indoor uncontrolled in the Fire Protection System.
3.3.1-58	Steel Halon/carbon dioxide fire suppression system piping, piping components, and piping elements exposed to Air – indoor, uncontrolled (External)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M26, "Fire Protection"	No	Consistent with NUREG-1801. The Fire Protection (B.2.1.16) program will be used to manage loss of material of carbon steel and gray cast iron carbon dioxide fire suppression system piping, piping components, and piping elements and tanks exposed to air – indoor, uncontrolled in the Fire Protection System. There are no in scope halon fire suppression systems at LSCS.
3.3.1-59	Steel Fire rated doors exposed to Air - indoor, uncontrolled, Air – outdoor	Loss of material due to wear	Chapter XI.M26, "Fire Protection"	No	Consistent with NUREG-1801. The Fire Protection (B.2.1.16) program will be used to manage loss of material of carbon steel and galvanized steel fire barriers (doors) exposed to air - indoor uncontrolled and air - outdoor 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
3.3.1-60	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	Chapter XI.M26, "Fire Protection," and Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Fire Protection (B.2.1.16) program and Structures Monitoring (B.2.1.34) program will be used to manage concrete cracking and spalling and cracking of concrete block, grout, and reinforced concrete fire barriers (penetration seals and fire stops) and fire barriers (walls and slabs) exposed to air - indoor uncontrolled in the Fire Protection System.
3.3.1-61	Reinforced concrete Structural fire barriers: walls, ceilings and floors exposed to Air – outdoor	Cracking, loss of material due to freeze-thaw, aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, "Fire Protection," and Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Fire Protection (B.2.1.16) program and Structures Monitoring (B.2.1.34) program will be used to manage concrete cracking and spalling of reinforced concrete fire barriers (walls and slabs) exposed to air - outdoor in the Fire Protection System.
3.3.1-62	Reinforced concrete Structural fire barriers: walls, ceilings and floors exposed to Air - indoor, uncontrolled, Air – outdoor	Loss of material due to corrosion of embedded steel	Chapter XI.M26, "Fire Protection," and Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Fire Protection (B.2.1.16) program and Structures Monitoring (B.2.1.34) program will be used to manage loss of material of embedded steel in reinforced concrete fire barriers (walls and slabs) exposed to air - indoor uncontrolled and air - outdoor 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
3.3.1-63	Steel Fire Hydrants exposed to Air – outdoor	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M27, "Fire Water System"	No	Consistent with NUREG-1801 with exceptions. The Fire Water System (B.2.1.17) program will be used to manage loss of material of ductile cast iron fire hydrants exposed to air – outdoor in the Fire Protection System. Exceptions apply to the NUREG-1801 recommendations for Fire Water System (B.2.1.17) program implementation.
3.3.1-64	Steel, Copper alloy Piping, piping components, and piping elements exposed to Raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion; fouling that leads to corrosion; flow blockage due to fouling	Chapter XI.M27, "Fire Water System"	No	Consistent with NUREG-1801 with exceptions. The Fire Water System (B.2.1.17) program will be used to manage loss of material of carbon steel, copper alloy with less than 15% zinc, ductile cast iron, galvanized steel, and gray cast iron piping, piping components, and piping elements and tanks exposed to raw water in the Fire Protection System. Exceptions apply to the NUREG-1801 recommendations for Fire Water System (B.2.1.17) program implementation. The Bolting Integrity (B.2.1.11) program has been substituted and will be used to manage loss of material of carbon and low alloy steel bolting exposed to raw water in the Nonessential Cooling Water System and 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
3.3.1-65	Aluminum Piping, piping components, and piping elements exposed to Raw water	Loss of material due to pitting and crevice corrosion; fouling that leads to corrosion; flow blockage due to fouling	Chapter XI.M27, "Fire Water System"	No	The Open-Cycle Cooling Water System (B.2.1.12) program has been substituted and will be used to manage loss of material in aluminum alloy piping, piping components, and piping elements exposed to raw water in the Nonessential Cooling Water System.
3.3.1-66	Stainless steel Piping, piping components, and piping elements exposed to Raw water	Loss of material due to pitting and crevice corrosion; fouling that leads to corrosion; flow blockage due to fouling	Chapter XI.M27, "Fire Water System"	No	Consistent with NUREG-1801 with exceptions. The Fire Water System (B.2.1.17) program will be used to manage loss of material of stainless steel piping, piping components, and piping elements exposed to raw water in the Fire Protection System. Exceptions apply to the NUREG-1801 recommendations for Fire Water System (B.2.1.17) program implementation.
3.3.1-67	Steel Tanks exposed to Air – outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Not Applicable. There are no steel tanks exposed to air – outdoor in Auxiliary 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**
3.3.1-68	Steel Piping, piping components, and piping elements exposed to Fuel oil	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M30, "Fuel Oil Chemistry", and Chapter XI.M32, "One-Time Inspection"	No	Not applicable. The loss of material in carbon steel piping, piping components, and piping elements exposed to fuel oil is addressed in Item Number 3.3.1-70.
3.3.1-69	Copper alloy Piping, piping components, and piping elements exposed to Fuel oil	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M30, “Fuel Oil Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801. The Fuel Oil Chemistry (B.2.1.19) program and One-Time Inspection (B.2.1.21) program will be used to manage loss of material of copper alloy with 15% zinc or more and copper alloy with less than 15% zinc piping, piping components, and piping elements exposed to fuel oil in the Diesel Generator and Auxiliaries System.
3.3.1-70	Steel Piping, piping components, and piping elements; tanks exposed to Fuel oil	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion; fouling that leads to corrosion	Chapter XI.M30, “Fuel Oil Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801. The Fuel Oil Chemistry (B.2.1.19) program and One-Time Inspection (B.2.1.21) program will be used to manage loss of material of carbon steel and gray cast iron piping, piping components, and piping elements and tanks exposed to fuel oil in the Diesel Generator and Auxiliaries 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
3.3.1-71	Stainless steel, Aluminum Piping, piping components, and piping elements exposed to Fuel oil	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M30, "Fuel Oil Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801. The Fuel Oil Chemistry (B.2.1.19) program and One-Time Inspection (B.2.1.21) program will be used to manage loss of material of stainless steel piping, piping components, and piping elements exposed to fuel oil in the Diesel Generator and Auxiliaries System.
3.3.1-72	Gray cast iron, Copper alloy (>15% Zn or >8% Al) Piping, piping components, and piping elements, Heat exchanger components exposed to Treated water, Closed-cycle cooling water, Soil, Raw water, Waste water	Loss of material due to selective leaching	Chapter XI.M33, "Selective Leaching"	No	Consistent with NUREG-1801. The Selective Leaching (B.2.1.22) program will be used to manage loss of material of copper alloy with 15% zinc or more, copper alloy with 15% zinc or more (with internal coating), and gray cast iron traveling water screen framework, heat exchanger components, piping, piping components, and piping elements, and tanks exposed to closed cycle cooling water, raw water, soil, treated water, and waste water in the Closed Cycle Cooling Water System, Demineralized Water Makeup System, Diesel Generator and Auxiliaries System, Drywell Pneumatic System, Essential Cooling Water System, Fire Protection System, Nonessential Cooling Water System, Primary Containment Ventilation System, Process Sampling and Post Accident Monitoring System, Reactor Core Isolation Cooling System, Standby Liquid Control System, and Suppression Pool Cleanup 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
3.3.1-73	Concrete; cementitious material Piping, piping components, and piping elements exposed to Air - outdoor	Changes in material properties due to aggressive chemical attack	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not Applicable. There are no concrete; cementitious material piping, piping components, and piping elements exposed to air - outdoor in Auxiliary Systems.
3.3.1-74	Concrete; cementitious material Piping, piping components, and piping elements exposed to Air - outdoor	Cracking due to settling	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not Applicable. There are no concrete; cementitious material piping, piping components, and piping elements exposed to air - outdoor in Auxiliary Systems.
3.3.1-75	Reinforced concrete, asbestos cement Piping, piping components, and piping elements exposed to Air – outdoor	Cracking due to aggressive chemical attack and leaching; Changes in material properties due to aggressive chemical attack	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not Applicable. There are no reinforced concrete, asbestos cement piping, piping components, and piping elements exposed to air – outdoor in Auxiliary Systems.
3.3.1-76	Elastomers Elastomer: seals and components exposed to Air – indoor, uncontrolled (Internal/External)	Hardening and loss of strength due to elastomer degradation	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage hardening and loss of strength of elastomer seals and components exposed to air - indoor uncontrolled in the Control Room Ventilation System, Diesel Generator and Auxiliaries System, and Safety-Related Ventilation 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**
3.3.1-77	Concrete; cementitious material Piping, piping components, and piping elements exposed to Air - outdoor	Loss of material due to abrasion, cavitation, aggressive chemical attack, and leaching	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not Applicable. There are no concrete; cementitious material piping, piping components, and piping elements exposed to air - outdoor in Auxiliary Systems.
3.3.1-78	Steel Piping and components (External surfaces), Ducting and components (External surfaces), Ducting; closure bolting exposed to Air – indoor, uncontrolled (External), Air – indoor, uncontrolled (External), Air – outdoor (External), Condensation (External)	Loss of material due to general corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of carbon or low alloy steel with stainless steel cladding, carbon steel, carbon steel (with internal coating), ductile cast iron, galvanized steel, and gray cast iron accumulators, ducting and components, heat exchanger components, piping, piping components, and piping elements, and tanks exposed to air - indoor uncontrolled and air - outdoor in the Closed Cycle Cooling Water System, Combustible Gas Control System, Compressed Air System, Control Rod Drive System, Control Room Ventilation System, Demineralized Water Makeup System, Diesel Generator and Auxiliaries System, Drywell Pneumatic System, Electrical Penetration Pressurization System, Essential Cooling Water System, Fire Protection System, Fuel Pool Cooling and Storage System, Nonessential Cooling Water System, Nonsafety-Related Ventilation System, Plant Drainage System, Primary

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**
					Containment Ventilation System, Process Radiation Monitoring System, Process Sampling and Post Accident Monitoring System, Radwaste System, Reactor Water Cleanup System, Safety-Related Ventilation System, Standby Liquid Control System, and Suppression Pool Cleanup System. The Fire Protection (B.2.1.16) program has been substituted and will be used to manage loss of material of carbon steel and galvanized steel fire barriers (doors) exposed to air - indoor uncontrolled and air – outdoor 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
3.3.1-79	Copper alloy Piping, piping components, and piping elements exposed to Condensation (External)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not Applicable. The loss of material in copper alloy with less than 15% zinc heat exchanger components exposed to condensation (external) is addressed in Item Number 3.3.1-89. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the loss of material in copper alloy heat exchanger tubes exposed to condensation (external). The tubes are located inside the heat exchanger and the external surfaces of the tubes are subject to the internal HVAC environment of condensation during normal operation. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program performs visual inspections of the external surfaces of the tubes during heat exchanger internal inspections.

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
3.3.1-80	Steel Heat exchanger components, Piping, piping components, and piping elements exposed to Air – indoor, uncontrolled (External), Air – outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of carbon steel heat exchanger shell side components exposed to air - indoor uncontrolled in the Demineralized Water Makeup System, Diesel Generator and Auxiliaries System, Control Room Ventilation System and Primary Containment Ventilation System. The Buried and Underground Piping (B.2.1.28) program has been substituted and will be used to manage loss of material of carbon steel piping, piping components, and piping elements located underground, exposed to an air-outdoor environment, in the Essential Cooling Water System and Nonessential Cooling Water System.
3.3.1-81	Copper alloy, Aluminum Piping, piping components, and piping elements exposed to Air – outdoor (External), Air - outdoor	Loss of material due to pitting and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not Applicable. There are no copper alloy or aluminum piping, piping components, and piping elements exposed to air – outdoor in Auxiliary 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
3.3.1-82	Elastomers Elastomer: seals and components exposed to Air – indoor, uncontrolled (External)	Loss of material due to wear	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of elastomer seals and components exposed to air - indoor uncontrolled in the Control Room Ventilation System, Safety-Related Ventilation System, and Standby Gas Treatment System.
3.3.1-83	Stainless steel Diesel engine exhaust piping, piping components, and piping elements exposed to Diesel exhaust	Cracking due to stress corrosion cracking	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage cracking of stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust in the Diesel Generator and Auxiliaries System.
3.3.1-84	There is no Item Number 3.3.1-84 listed in NUREG-1800 or subsequent issued ISGs				
3.3.1-85	Elastomers Elastomer seals and components exposed to Closed-cycle cooling water	Hardening and loss of strength due to elastomer degradation	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Not Applicable. There are no elastomer seals and components exposed to closed cycle cooling water in Auxiliary 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
3.3.1-86	Elastomers, Elastomers linings, Elastomer: seals and components exposed to Treated borated water, Treated water, Raw water	Hardening and loss of strength due to elastomer degradation	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Not applicable. There are no elastomer linings, seals or components exposed to treated borated water, treated water, or raw water in Auxiliary Systems.
3.3.1-87	There is no Item Number 3.3.1-87 listed in NUREG-1800 or subsequent issued ISGs				
3.3.1-88	Steel; stainless steel Piping, piping components, and piping elements, Piping, piping components, and piping elements, diesel engine exhaust exposed to Raw water (potable), Diesel exhaust	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of carbon steel and stainless diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust in the Diesel Generator and Auxiliaries System and 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**
3.3.1-89	Steel, Copper alloy Piping, piping components, and piping elements exposed to Moist air or condensation (Internal)	Loss of material due to general, pitting, and crevice corrosion	For fire water system components: Chapter XI.M27, "Fire Water System," or for other components: Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of carbon steel, copper alloy with 15% zinc or more, copper alloy with less than 15% zinc, ductile cast iron, and gray cast iron accumulators, heat exchanger components, piping, piping components, and piping elements, and tanks exposed to condensation in the Control Rod Drive System, Control Room Ventilation System, Diesel Generator and Auxiliaries System, Drywell Pneumatic System, Fire Protection System, Nonsafety-Related Ventilation System, Primary Containment Ventilation System, Safety-Related Ventilation System, Standby Gas Treatment System, and Standby Liquid Control 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**
3.3.1-90	Steel 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	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of carbon steel and galvanized steel ducting and components, heat exchanger components, piping, piping components, and piping elements exposed to condensation in the Combustible Gas Control System, Control Room Ventilation System, Drywell Pneumatic System, and Safety-Related Ventilation System.
3.3.1-91	Steel Piping, piping components, and piping elements; tanks exposed to Waste Water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of carbon steel, ductile cast iron, and galvanized steel heat exchanger components, piping, piping components, and piping elements, and tanks exposed to waste water in the Combustible Gas Control System, Control Rod Drive System, Diesel Generator and Auxiliaries System, Fuel Pool Cooling and Storage System, Plant Drainage System, Reactor Coolant Pressure Boundary System, and Standby Liquid Control 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
3.3.1-92	Aluminum Piping, piping components, and piping elements exposed to Condensation (Internal)	Loss of material due to pitting and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of aluminum alloy ducting and components, piping, piping components, and piping elements, and tanks exposed to condensation in the Condensate System, Control Room Ventilation System, Diesel Generator and Auxiliaries System, Drywell Pneumatic System, Process Radiation Monitoring System, Safety-Related Ventilation System, and Standby Gas Treatment System.
3.3.1-93	Copper alloy Piping, piping components, and piping elements exposed to Raw water (potable)	Loss of material due to pitting and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Not Applicable. There are no copper alloy piping, piping components, and piping elements exposed to raw water (potable) in Auxiliary 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
3.3.1-94	Stainless steel Ducting and components exposed to Condensation	Loss of material due to pitting and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of carbon or low alloy steel with stainless steel cladding and stainless steel ducting and components, piping, piping components, and piping elements exposed to condensation in the Control Room Ventilation System, Primary Containment Ventilation System, Process Sampling and Post Accident Monitoring System, and Safety-Related Ventilation 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
3.3.1-95	Copper alloy, Stainless steel, Nickel alloy, Steel Piping, piping components, and piping elements, Heat exchanger components, Piping, piping components, and piping elements; tanks exposed to Waste water, Condensation (Internal)	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of carbon steel, copper alloy with 15% zinc or more, copper alloy with less than 15% zinc, nickel alloy, and stainless steel accumulators, ducting and components, piping, piping components, and piping elements, structural steel elements, and tanks exposed to condensation and waste water in the Closed Cycle Cooling Water System, Combustible Gas Control System, Control Rod Drive System, Control Room Ventilation System, Diesel Generator and Auxiliaries System, Drywell Pneumatic System, Fire Protection System, Fuel Pool Cooling and Storage System, Plant Drainage System, Primary Containment Ventilation System, Process Radiation Monitoring System, Process Sampling and Post Accident Monitoring System, Radwaste System, Reactor Core Isolation Cooling System, Safety-Related Ventilation System, Standby Gas Treatment System, Auxiliary Building, Diesel Generator Building, Primary Containment, Radwaste Building, Reactor Building, and Turbine Building.

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
3.3.1-96	Elastomers Elastomer: seals and components exposed to Air – indoor, uncontrolled (Internal)	Loss of material due to wear	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Not Applicable. There are no elastomer seals and components exposed to air – indoor, uncontrolled (internal) in Auxiliary Systems.
3.3.1-97	Steel Piping, piping components, and piping elements, Reactor coolant pump oil collection system: tanks, Reactor coolant pump oil collection system: piping, tubing, valve bodies exposed to Lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.26) program and One-Time Inspection (B.2.1.21) program will be used to manage loss of material of carbon steel and gray cast iron gearbox, heat exchanger components, piping, piping components, and piping elements and tanks exposed to lubricating oil in the Closed Cycle Cooling Water System, Control Rod Drive System, Control Room Ventilation System, Diesel Generator and Auxiliaries System, and Drywell Pneumatic System.
3.3.1-98	Steel Heat exchanger components exposed to Lubricating oil	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion; fouling that leads to corrosion	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.26) program and One-Time Inspection (B.2.1.21) program will be used to manage loss of material of carbon steel and gray cast iron heat exchanger components exposed to lubricating oil in the Essential Cooling Water System and Diesel Generator and Auxiliaries 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
3.3.1-99	Copper alloy, Aluminum Piping, piping components, and piping elements exposed to Lubricating oil	Loss of material due to pitting and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.26) program and One-Time Inspection (B.2.1.21) program will be used to manage loss of material of aluminum alloy, copper alloy with 15% zinc or more, and copper alloy with less than 15% zinc heat exchanger components, piping, piping components, and piping elements, and tanks exposed to lubricating oil in the Control Room Ventilation System, Diesel Generator and Auxiliaries System, Drywell Pneumatic System, Primary Containment Ventilation System, and Reactor Coolant Pressure Boundary System.
3.3.1-100	Stainless steel Piping, piping components, and piping elements exposed to Lubricating oil	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.26) program and One-Time Inspection (B.2.1.21) program will be used to manage loss of material of stainless steel heat exchanger components, piping, piping components, and piping elements exposed to lubricating oil in the Control Room Ventilation System, Diesel Generator and Auxiliaries System, and Essential Cooling Water 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**
3.3.1-101	Aluminum Heat exchanger tubes exposed to Lubricating oil	Reduction of heat transfer due to fouling	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.26) program and One-Time Inspection (B.2.1.21) program will be used to manage reduction of heat transfer of aluminum alloy heat exchanger components exposed to lubricating oil in the Diesel Generator and Auxiliaries System.
3.3.1-102	Boral®; boron steel, and other materials (excluding Boraflex) Spent fuel storage racks: neutron-absorbing sheets (PWR), Spent fuel storage racks: neutron-absorbing sheets (BWR) exposed to Treated borated water, Treated water	Reduction of neutron-absorbing capacity; change in dimensions and loss of material due to effects of SFP environment	Chapter XI.M40, "Monitoring of Neutron-Absorbing Materials other than Boraflex"	No	Consistent with NUREG-1801. The Monitoring of Neutron-Absorbing Materials Other Than Boraflex (B.2.1.27) program will be used to manage reduction of neutron absorbing capacity; change in dimensions and loss of material of the Boral and Rio-Tinto Alcan composite fuel storage racks exposed to treated water in the Fuel Pool Cooling and Storage System.
3.3.1-103	Reinforced concrete, asbestos cement Piping, piping components, and piping elements exposed to Soil or concrete	Cracking due to aggressive chemical attack and leaching; Changes in material properties due to aggressive chemical attack	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no reinforced concrete, asbestos cement piping, piping components, and piping elements exposed to soil or concrete in Auxiliary 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
3.3.1-104	HDPE, Fiberglass Piping, piping components, and piping elements exposed to Soil or concrete	Cracking, blistering, change in color due to water absorption	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no HDPE, fiberglass piping, piping components, and piping elements exposed to soil or concrete in Auxiliary Systems.
3.3.1-105	Concrete cylinder piping, Asbestos cement pipe Piping, piping components, and piping elements exposed to Soil or concrete	Cracking, spalling, corrosion of rebar due to exposure of rebar	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no concrete cylinder piping, asbestos cement pipe piping, piping components, and piping elements exposed to soil or concrete in Auxiliary Systems.
3.3.1-106	Steel (with coating or wrapping) Piping, piping components, and piping elements exposed to Soil or concrete	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Consistent with NUREG-1801. The Buried and Underground Piping (B.2.1.28) program will be used to manage loss of material of carbon steel, ductile cast iron, and gray cast iron piping, piping components, and piping elements exposed to soil in the Diesel Generator and Auxiliaries System, Essential Cooling Water System, Fire Protection System, and Nonessential Cooling Water System.
3.3.1-107	Stainless steel, nickel alloy piping, piping components, and piping elements exposed to Soil or concrete	Loss of material due to pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no stainless steel, nickel alloy piping, piping components, and piping elements exposed to soil or concrete in Auxiliary 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
3.3.1-108	Titanium, super austenitic, aluminum, copper alloy, stainless steel, nickel alloy piping, piping components, and piping elements, bolting exposed to soil or concrete	Loss of material due to pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no titanium, super austenitic, aluminum, copper alloy, stainless steel, nickel alloy piping, piping components, and piping elements, bolting exposed to soil or concrete in Auxiliary Systems.
3.3.1-109	Steel Bolting exposed to Soil or concrete	Loss of material due to general, pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Consistent with NUREG-1801. The Buried and Underground Piping (B.2.1.28) program will be used to manage loss of material of carbon and low alloy steel bolting exposed to soil in the Fire Protection System.
3.3.1-109x	Underground aluminum, copper alloy, stainless steel, nickel alloy steel piping, piping components, and piping elements	Loss of material due to general (steel only), pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no underground aluminum, copper alloy, stainless steel, nickel alloy steel piping, piping components, and piping elements in Auxiliary 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**
3.3.1-110	Stainless steel Piping, piping components, and piping elements exposed to Treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking," and Chapter XI.M2, "Water Chemistry"	No	Not Applicable. The BWR Stress Corrosion Cracking (B.2.1.7) program manages cracking initiation and growth in Reactor Coolant Pressure Boundary System piping, piping components, and piping elements ≥ 4 inch NPS through the implementation of an augmented Inservice Inspection (ISI) program in accordance with ASME Code, Section XI. Cracking in stainless steel piping, piping components, and piping elements < 4 inch NPS exposed to treated water >140°F in the Auxiliary Systems is addressed in Item Number 3.3.1-19.
3.3.1-111	Steel Structural steel exposed to Air – indoor, uncontrolled (External)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S6, "Structures Monitoring"	No	Not Applicable. With the exception of the Cranes, Hoists and Refueling Equipment System, there is no structural steel exposed to air-indoor uncontrolled in Auxiliary Systems. The loss of material in structural steel exposed to air-indoor uncontrolled in the Cranes, Hoists and Refueling Equipment System is addressed in Item Number 3.3.1-52.

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
3.3.1-112	Steel Piping, piping components, and piping elements exposed to Concrete	None	None, provided 1) attributes of the concrete are consistent with ACI 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG-1557, and 2) plant OE indicates no degradation of the concrete	No, if conditions are met.	Consistent with NUREG-1801.
3.3.1-113	Aluminum Piping, piping components, and piping elements exposed to Air – dry (Internal/External), Air – indoor, uncontrolled (Internal/External), Air – indoor, controlled (External), Gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-114	Copper alloy Piping, piping components, and piping elements exposed to Air – indoor, uncontrolled (Internal/External), Air – dry, Gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-115	PWR 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
3.3.1-116	Galvanized steel Piping, piping components, and piping elements exposed to Air - indoor, uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-117	Glass Piping elements exposed to Air – indoor, uncontrolled (External), Lubricating oil, Closed-cycle cooling water, Air – outdoor, Fuel oil, Raw water, Treated water, Treated borated water, Air with borated water leakage, Condensation (Internal/External) Gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-118	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.

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
3.3.1-119	Nickel alloy, PVC, Glass Piping, piping components, and piping elements exposed to Air with borated water leakage, Air – indoor, uncontrolled, Condensation (Internal), Waste Water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-120	Stainless steel Piping, piping components, and piping elements exposed to Air – indoor, uncontrolled (Internal/External), Air – indoor, uncontrolled (External), Air with borated water leakage, Concrete, Air – dry, Gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-121	Steel Piping, piping components, and piping elements exposed to Air – indoor, controlled (External), Air – dry, Gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

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
3.3.1-122	Titanium Heat exchanger components, Piping, piping components, and piping elements exposed to Air – indoor, uncontrolled or Air – outdoor	None	None	NA - No AEM or AMP	Not Applicable. There are no titanium heat exchanger components, piping, piping components, and piping elements exposed to air – indoor uncontrolled or air – outdoor in Auxiliary Systems.
3.3.1-123	Titanium (ASTM Grades 1,2, 7, 11, or 12 that contains > 5% aluminum or more than 0.20% oxygen or any amount of tin) Heat exchanger components other than tubes, Piping, piping components, and piping elements exposed to Raw water	None	None	NA - No AEM or AMP	Not Applicable. There are no titanium (ASTM Grades 1,2, 7, 11, or 12 that contains > 5% aluminum or more than 0.20% oxygen or any amount of tin) heat exchanger components other than tubes, piping, piping components, and piping elements exposed to raw water in Auxiliary Systems.
3.3.1-124	Stainless steel, Steel (with stainless steel or nickel-alloy cladding), Spent fuel storage racks (BWR), Spent fuel storage racks (PWR), Piping, piping components, and piping elements; exposed to Treated water >60°C (>140°F), Treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Not Applicable. There are no stainless steel or steel (with stainless steel or nickel-alloy cladding) spent fuel storage racks, piping, piping components, and piping elements exposed to treated water >60°C (>140°F) or treated borated water >60°C (>140°F) in Auxiliary 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
3.3.1-125	Steel (with stainless steel cladding), stainless steel Spent fuel storage racks (BWR), Spent fuel storage racks (PWR), Piping, piping components, and piping elements; exposed to Treated water, Treated borated water	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of stainless steel storage racks (control rod blade, defective fuel, and spent fuel) exposed to treated water in the Fuel Pool Cooling and Storage System. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.3.1-126	Any material, piping, piping components, and piping elements exposed to treated water, treated water (borated), raw water	Wall thinning due to erosion	Chapter XI.M17, "Flow-Accelerated Corrosion"	No	Not Applicable. There are no piping, piping components, and piping elements exposed to treated water, treated water (borated) or raw water susceptible to wall thinning due to erosion in Auxiliary 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
3.3.1-127	Metallic piping, piping components, and tanks exposed to raw water or waste water	Loss of material due to recurring internal corrosion	A plant-specific aging management program is to be evaluated to address recurring internal corrosion	Yes, plant-specific	The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage the loss of material due to recurring internal corrosion in carbon steel piping, piping components, and piping elements exposed to raw water in the Essential Cooling Water System and Nonessential Cooling Water System. The Fire Water System (B.2.1.17) program will be used to manage the loss of material due to recurring internal corrosion in carbon steel piping, piping components, and piping elements exposed to raw water in the Fire Protection System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage the loss of material due to recurring internal corrosion in carbon steel and galvanized steel piping, piping components, and piping elements exposed to waste water in the Plant Drainage System. See Subsection 3.3.2.2.8.

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
3.3.1-128	Steel, stainless steel, or aluminum tanks (within the scope of Chapter XI.M29, "Aboveground Metallic Tanks") exposed to soil or concrete, or the following external environments air-outdoor, air-indoor uncontrolled, moist air, condensation	Loss of material due to general (steel only), pitting, or crevice corrosion; cracking due to stress corrosion cracking (stainless steel and aluminum only)	Chapter XI.M29, "Aboveground Metallic Tanks"	No	Not Applicable. There are no steel, stainless steel, or aluminum outdoor tanks constructed on soil or concrete, or, indoor large-volume tanks (100,000 gallons and greater) designed to internal pressures approximating atmospheric pressure and exposed internally to water (e.g., within the scope of Chapter XI.M29, "Aboveground Metallic Tanks") exposed to soil or concrete, or the following external environments air-outdoor, air-indoor uncontrolled, moist air or condensation in Auxiliary Systems.
3.3.1-129	Steel tanks exposed to soil or concrete; air-indoor uncontrolled, raw water, treated water, waste water, condensation	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M29, "Aboveground Metallic Tanks"	No	Not Applicable. There are no steel outdoor tanks constructed on soil or concrete, or, indoor large-volume tanks (100,000 gallons and greater) designed to internal pressures approximating atmospheric pressure and exposed internally to water (e.g., within the scope of Chapter XI.M29, "Aboveground Metallic Tanks") exposed to soil or concrete, air-indoor uncontrolled, raw water, treated water, waste water or condensation in Auxiliary 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**
3.3.1-130	Metallic sprinklers exposed to air-indoor controlled, air-indoor uncontrolled, air-outdoor, moist air, condensation, raw water, treated water	Loss of material due to general (where applicable), pitting, crevice, and microbiologically-influenced corrosion, fouling that leads to corrosion; flow blockage due to fouling	Chapter XI.M27, “Fire Water System”	No	Consistent with NUREG-1801 with exceptions. The Fire Water System (B.2.1.17) program will be used to manage loss of material and flow blockage of metallic sprinklers exposed to air-indoor uncontrolled, air-outdoor, condensation, and raw water in the Fire Protection System. Exceptions apply to the NUREG-1801 recommendations for Fire Water System (B.2.1.17) program implementation.
3.3.1-131	Steel, stainless steel, copper alloy, or aluminum fire water system piping, piping components and piping elements exposed to air-indoor uncontrolled (internal), air-outdoor (internal), or condensation (internal)	Loss of material due to general (steel, and copper alloy only), pitting, crevice, and microbiologically-influenced corrosion, fouling that leads to corrosion; flow blockage due to fouling	Chapter XI.M27, “Fire Water System”	No	Consistent with NUREG-1801 with exceptions. The Fire Water System (B.2.1.17) program will be used to manage loss of material and flow blockage of carbon steel and stainless steel piping, piping components and piping elements exposed to air-indoor uncontrolled and condensation in the Fire Protection System. Exceptions apply to the NUREG-1801 recommendations for Fire Water System (B.2.1.17) program implementation.

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**
3.3.1-132	Insulated steel, stainless steel, copper alloy, aluminum, or copper alloy (> 15% Zn) piping, piping components, and tanks exposed to condensation, air-outdoor	Loss of material due to general (steel, and copper alloy only), pitting, and crevice corrosion; cracking due to stress corrosion cracking (aluminum, stainless steel and copper alloy (>15% Zn) only)	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components" or Chapter XI.M29, "Aboveground Metallic Tanks" (for tanks only)	No	The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage the loss of material of insulated carbon steel piping, piping components, and piping elements and cracking of insulated stainless steel piping, piping components, and piping elements exposed to condensation in the Closed Cycle Cooling Water System, Control Room Ventilation System, Essential Cooling Water System, Nonessential Cooling Water System, Nonsafety-Related Ventilation System, and Primary Containment Ventilation System.
3.3.1-133	Underground HDPE piping, piping components, and piping elements in an air-indoor uncontrolled or condensation (external) environment	Cracking, blistering, change in color due to water absorption	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no underground HDPE piping, piping components, and piping elements in an air-indoor uncontrolled or condensation (external) environment in Auxiliary Systems.
3.3.1-134	Steel, stainless steel, or copper alloy piping, piping components, and piping elements, and heat exchanger components exposed to a raw water environment (for nonsafety-related components not covered by NRC GL 89-13)	Loss of material due to general (steel and copper alloy only), pitting, crevice, and microbiologically influenced corrosion, fouling that leads to corrosion	Chapter XI.MI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Not Applicable. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage the nonsafety-related steel, stainless steel, and copper alloy piping, piping components, and piping elements, and heat exchanger components not covered by NRC GL 89-13 and exposed to a raw water environment.

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**
3.3.1-135	Steel or stainless steel pump casings submerged in a waste water (internal and external) environment	Loss of material due to general (steel only), pitting, crevice, and microbiologically influenced corrosion	Chapter XI.MI.M36, “External Surfaces Monitoring of Mechanical Components”	No	Not Applicable. There are no steel or stainless steel pump casings submerged in a waste water (internal and external) environment in Auxiliary Systems.
3.3.1-136	Steel, stainless steel or aluminum fire water storage tanks exposed to air-indoor uncontrolled, air-outdoor, condensation, moist air, raw water, treated water	Loss of material due to general (steel only), pitting, crevice, and microbiologically-influenced corrosion, fouling that leads to corrosion; cracking due to stress corrosion cracking (stainless steel and aluminum only)	Chapter XI.M27, "Fire Water System"	No	Not Applicable. There are no steel, stainless steel or aluminum fire water storage tanks exposed to air-indoor uncontrolled, air-outdoor, condensation, moist air, raw water, or treated water in Auxiliary Systems.
3.3.1-137	Steel, stainless steel or aluminum tanks (within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to treated water, treated borated water	Loss of material due to general (steel only) pitting and crevice corrosion	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Not Applicable. There are no steel, stainless steel, or aluminum outdoor tanks constructed on soil or concrete, or, indoor large-volume tanks (100,000 gallons and greater) designed to internal pressures approximating atmospheric pressure and exposed internally to water (e.g., within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to treated water or treated borated water in Auxiliary Systems.

Table 3.3.2-1

Closed Cycle Cooling Water System

Summary of Aging Management Evaluation

Table 3.3.2-1 Closed Cycle Cooling Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Heat Exchanger - (CRD Feed Pump Bearing and Gear Oil Coolers) Tube Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
		Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
					Selective Leaching (B.2.1.22)	VII.C2.A-50	3.3.1-72	C
Heat Exchanger - (Clean-up Non-Regenerative Heat Exchanger) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.E3.AP-189	3.3.1-46	A

Table 3.3.2-1 Closed Cycle Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Drywell Equipment Drain Sump Heat Exchanger) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
Heat Exchanger - (Drywell Penetration Cooling Coils) Tube Side Components	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	C
Heat Exchanger - (Nitrogen Compressor Aftercooler) Shell Side Components	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	C
Heat Exchanger - (Nitrogen Compressor Inter-Cooler) Tube Side Components	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Closed Cycle Cooling Water > 140 F (Internal)	Cracking	Closed Treated Water Systems (B.2.1.13)	VII.E3.AP-192	3.3.1-44	A
				Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	C

Table 3.3.2-1 Closed Cycle Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (RWCU Pump Heat Exchanger) Tube Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.E3.AP-189	3.3.1-46	A
Heat Exchanger - (Reactor Building Closed Cooling Water Heat Exchanger) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
Heat Exchanger - (Reactor Building Equipment Drain Tank Heat Exchanger) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
Heat Exchanger - (Reactor Building Ventilation Instrument Room A/C Unit) Tube Side Components	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	C
Hoses	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-1 Closed Cycle Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hoses	Leakage Boundary	Carbon Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 1
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.C2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.21)	VII.C2.AP-127	3.3.1-97	A
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Lubricating Oil (Internal)	None	None	VII.J.AP-15	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water > 140 F (Internal)	Cracking	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-186	3.3.1-43	A
				Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A

Table 3.3.2-1 Closed Cycle Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 1
Pump Casing (Reactor Building Closed Cooling Water Pump)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
Tanks (Reactor Building Closed Cooling Water Chemical Feeder)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
Tanks (Reactor Building Closed Cooling Water Expansion Tank)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-280	3.3.1-95	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 1
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-1 Closed Cycle Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 1
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A

Table 3.3.2-1 Closed Cycle Cooling Water System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. These components are in an air-indoor, uncontrolled environment, and are insulated. Because of the potential for air in-leakage through minor gaps in insulation, condensation can occur underneath the insulation on components when the operating temperature of the component is below the dew point of the air on the external surfaces of the insulation.

Table 3.3.2-2

Combustible Gas Control System

Summary of Aging Management Evaluation

Table 3.3.2-2 Combustible Gas Control System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Blower Housing	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.A-08	3.3.1-90	C
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Hoses	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A

Table 3.3.2-2 Combustible Gas Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Waste Water (Internal)	None	None	VII.J.AP-277	3.3.1-119	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.A-08	3.3.1-90	C
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.A-08	3.3.1-90	C
Recombiners	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	C

Table 3.3.2-2 Combustible Gas Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.A-08	3.3.1-90	C
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.A-08	3.3.1-90	C

Table 3.3.2-2 Combustible Gas Control System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

Table 3.3.2-3
Compressed Air System
Summary of Aging Management Evaluation

Table 3.3.2-3 Compressed Air System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.A-26	3.3.1-55	B
	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.A-26	3.3.1-55	B
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.A-26	3.3.1-55	B
	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.A-26	3.3.1-55	B
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A

Table 3.3.2-3 Compressed Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Structural Integrity	Copper Alloy with less than 15% Zinc	Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-240	3.3.1-54	B

Table 3.3.2-3 Compressed Air System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

Table 3.3.2-4
Control Rod Drive System
Summary of Aging Management Evaluation

Table 3.3.2-4 Control Rod Drive System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Accumulator	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.A-23	3.3.1-89	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	D
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	D
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A

Table 3.3.2-4 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Drip Pan	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
Gearbox (CRD Pump)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.E4.AP-127	3.3.1-97	C
					One-Time Inspection (B.2.1.21)	VII.E4.AP-127	3.3.1-97	C
Heat Exchanger - (CRD Feed Pump Bearing and Gear Oil Cooler) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.E4.AP-127	3.3.1-97	C
					One-Time Inspection (B.2.1.21)	VII.E4.AP-127	3.3.1-97	C
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.A-23	3.3.1-89	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.E4.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.21)	VII.E4.AP-127	3.3.1-97	A

Table 3.3.2-4 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Treated Water (Internal)	None	None	VII.J.AP-51	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.A-23	3.3.1-89	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B

Table 3.3.2-4 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (CRD Pump)	Leakage Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.E4.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.21)	VII.E4.AP-127	3.3.1-97	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.A-23	3.3.1-89	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B

Table 3.3.2-4 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B

Table 3.3.2-4 Control Rod Drive System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The TLAA designation in the Aging Management Review column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.3.2-5
Control Room Ventilation System
Summary of Aging Management Evaluation

Table 3.3.2-5 Control Room Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Ducting and Components	Leakage Boundary	Stainless Steel	Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-99	3.3.1-94	A, 1
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C
	Pressure Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-142	3.3.1-92	C
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.A-10	3.3.1-78	A

Table 3.3.2-5 Control Room Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Ducting and Components	Pressure Boundary	Carbon Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.A-08	3.3.1-90	A
		Elastomers	Air - Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.AP-102	3.3.1-76	A
			Condensation (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 3
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.A-405	3.3.1-132	A, 4
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.A-08	3.3.1-90	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	C
			Condensation (Internal)	None	None	VII.J.AP-97	3.3.1-117	C
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-99	3.3.1-94	A
Flexible Connection	Pressure Boundary	Elastomers	Air - Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.AP-102	3.3.1-76	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.AP-113	3.3.1-82	A

Table 3.3.2-5 Control Room Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Flexible Connection	Pressure Boundary	Elastomers	Condensation (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 3
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 3
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Air-Cooled Condenser) Fins	Heat Transfer	Aluminum Alloy	Condensation (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Air-Cooled Condenser) Shell Side Components	Pressure Boundary	Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.A-08	3.3.1-90	C
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Air-Cooled Condenser) Tubes	Heat Transfer	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (Internal)	None	None	VII.J.AP-9	3.3.1-114	C
			Condensation (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2

Table 3.3.2-5 Control Room Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Air-Cooled Condenser) Tubes	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (Internal)	None	None	VII.J.AP-9	3.3.1-114	C
			Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	C
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Supply Coolers) Fins	Heat Transfer	Aluminum Alloy	Condensation (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Supply Coolers) Shell Side Components	Pressure Boundary	Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.A-08	3.3.1-90	C
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Supply Coolers) Tubes	Heat Transfer	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (Internal)	None	None	VII.J.AP-9	3.3.1-114	C
			Condensation (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2

Table 3.3.2-5 Control Room Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Control Room and Aux Elec Equip Room HVAC Supply Coolers) Tubes	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (Internal)	None	None	VII.J.AP-9	3.3.1-114	C
			Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	C
Heat Exchanger - (Control Room and Aux Equip Room HVAC Refrigerant Compressor Oil Cooler) Shell Side Components	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.AP-41	3.3.1-80	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	C
Heat Exchanger - (Control Room and Aux Equip Room HVAC Refrigerant Compressor Oil Cooler) Tubes	Heat Transfer	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Lubricating Oil (Internal)	Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-78	3.2.1-51	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-78	3.2.1-51	A
	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-133	3.3.1-99	C
					One-Time Inspection (B.2.1.21)	VII.H2.AP-133	3.3.1-99	C

Table 3.3.2-5 Control Room Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-134	3.3.1-113	A
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.F1.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.21)	VII.F1.AP-127	3.3.1-97	A
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-9	3.3.1-114	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 4
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-133	3.3.1-99	A

Table 3.3.2-5 Control Room Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-98	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-138	3.3.1-100	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-138	3.3.1-100	A
Tanks (Control Room and Aux Elec Equip Room HVAC Refrigerant Receiver)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	C
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	C
Valve Body	Pressure Boundary	Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-9	3.3.1-114	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 4
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A

Table 3.3.2-5 Control Room Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Ductile Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A

Table 3.3.2-5 Control Room Ventilation System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The stainless steel drip pans are located internal to the ventilation ductwork, and therefore the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the applicable aging effects.

2. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the reduction of heat transfer aging effect applicable to this component type, material, and environment combination. The component is located within HVAC ducting and components, and the external surfaces of this component are subject to the internal HVAC environment of condensation during normal operation. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program performs visual inspections which are capable of identifying aging mechanisms which cause reduction of heat transfer.

3. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

4. These components are in an air-indoor, uncontrolled environment, and are insulated. Because of the potential for air in-leakage through minor gaps in insulation, condensation can occur underneath the insulation on components when the operating temperature of the component is below the dew point of the air on the external surfaces of the insulation.

Table 3.3.2-6

Cranes, Hoists and Refueling Equipment System

Summary of Aging Management Evaluation

Table 3.3.2-6 Cranes, Hoists and Refueling Equipment System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Structural Integrity	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	III.B5.TP-248	3.5.1-80	E, 1
				Loss of Preload	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	III.B5.TP-261	3.5.1-88	E, 1
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Preload	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	III.B5.TP-261	3.5.1-88	E, 1
			Treated Water (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	III.B1.2.TP-232	3.5.1-85	E, 1
					Water Chemistry (B.2.1.2)	III.B1.2.TP-232	3.5.1-85	B
				Loss of Preload	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	III.B5.TP-261	3.5.1-88	E, 1
Crane/Hoist (Bridge/Girders/Trolley/Beam/Jib Boom)	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	VII.B.A-06	3.3.1-1	A, 2

Table 3.3.2-6 Cranes, Hoists and Refueling Equipment System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Crane/Hoist (Bridge/Girders/Trolley/Beam/Jib Boom)	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	VII.B.A-07	3.3.1-52	A
Crane/Hoist (Fuel Prep Machine)	Structural Integrity	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	III.B5.TP-8	3.5.1-95	C
			Treated Water (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	VII.A4.AP-130	3.3.1-25	E, 1
					Water Chemistry (B.2.1.2)	VII.A4.AP-130	3.3.1-25	D
Crane/Hoist (Rail Systems)	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	VII.B.A-07	3.3.1-52	A
						VII.B.A-05	3.3.1-53	A
Crane/Hoist (Refueling Platform)	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	VII.B.A-07	3.3.1-52	A
Crane/Hoist (Scorpion Work Platform)	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	VII.B.A-07	3.3.1-52	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C

Table 3.3.2-6 Cranes, Hoists and Refueling Equipment System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The Inspection of Overhead Heavy Load and Light Load (Related to Fuel Handling) Systems (B.2.1.14) program is substituted to manage the aging effect(s) applicable to this component type, material and environment combination.
2. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.7.

Table 3.3.2-7

Demineralized Water Makeup System

Summary of Aging Management Evaluation

Table 3.3.2-7 Demineralized Water Makeup System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Heat Exchanger - (Electric Hot Water) Shell Side Components	Leakage Boundary	Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	C
			Treated Water (Internal)	None	None	VII.J.AP-51	3.3.1-117	C
Heat Exchanger - (Steam Generator) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.AP-41	3.3.1-80	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-77	3.4.1-15	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-77	3.4.1-15	B
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-77	3.4.1-15	C
					Water Chemistry (B.2.1.2)	VIII.E.SP-77	3.4.1-15	D
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-140	3.3.1-22	A

Table 3.3.2-7 Demineralized Water Makeup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Copper Alloy with less than 15% Zinc	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VII.E4.AP-140	3.3.1-22	B
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	A
			Treated Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Treated Water (Internal)	None	None	VII.J.AP-51	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A
Pump Casing (Evaporative Cooler)	Leakage Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	A
					Selective Leaching (B.2.1.22)	VII.A4.AP-31	3.3.1-72	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A

Table 3.3.2-7 Demineralized Water Makeup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Treated Water (Internal)	Cracking	One-Time Inspection (B.2.1.21)			H, 1
					Water Chemistry (B.2.1.2)			H, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-140	3.3.1-22	B
					Selective Leaching (B.2.1.22)	VII.E4.AP-32	3.3.1-72	A
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-140	3.3.1-22	B
		Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	A
					Selective Leaching (B.2.1.22)	VII.A4.AP-31	3.3.1-72	A

Table 3.3.2-7 Demineralized Water Makeup System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Vent valves in supply pipe to the clean gland water tank are brass, ASTM B584, alloy material which has a zinc content of 15 percent. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program are used to manage cracking in treated water for this component, material, and environment combination.

2. The aging effects for galvanized steel in a treated water environment include loss of coating integrity. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) is used to manage the identified aging effect applicable to galvanized steel in a treated water environment.

Table 3.3.2-8

Diesel Generator and Auxiliaries System

Summary of Aging Management Evaluation

Table 3.3.2-8 Diesel Generator and Auxiliaries System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Air Dryer (Housing)	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
Bird Screen	Filter	Stainless Steel	Air - Outdoor (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.H2.AP-209	3.3.1-4	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.H2.AP-221	3.3.1-6	A
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Electric Heaters (Housing)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
Expansion Joints	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Expansion Joints	Pressure Boundary	Stainless Steel	Diesel Exhaust (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.AP-128	3.3.1-83	A
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.AP-104	3.3.1-88	A
Flame Arrestor	Pressure Boundary	Ductile Cast Iron	Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-78	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
Flow Device	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-105	3.3.1-70	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-138	3.3.1-100	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-138	3.3.1-100	A
	Throttle	Carbon Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-105	3.3.1-70	A
		Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-138	3.3.1-100	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Flow Device	Throttle	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.H2.AP-138	3.3.1-100	A
Heat Exchanger - (D/G Cooler) Shell Side Components	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.H2.AP-41	3.3.1-80	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
Heat Exchanger - (D/G Cooler) Tube Sheet	Pressure Boundary	Copper Alloy with 15% Zinc or More	Closed Cycle Cooling Water (External)	Cracking	Closed Treated Water Systems (B.2.1.13)			H, 3
				Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	C
					Selective Leaching (B.2.1.22)	VII.C2.AP-43	3.3.1-72	C
Heat Exchanger - (D/G Cooler) Tubes	Heat Transfer	Copper Alloy with 15% Zinc or More	Closed Cycle Cooling Water (External)	Reduction of Heat Transfer	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-205	3.3.1-50	A
	Pressure Boundary	Copper Alloy with 15% Zinc or More	Closed Cycle Cooling Water (External)	Cracking	Closed Treated Water Systems (B.2.1.13)			H, 3
				Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	C
					Selective Leaching (B.2.1.22)	VII.C2.AP-43	3.3.1-72	C
Heat Exchanger - (Lube Oil Cooler) Shell Side Components	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.H2.AP-41	3.3.1-80	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-131	3.3.1-98	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-131	3.3.1-98	A
Heat Exchanger - (Lube Oil Cooler) Tube Sheet	Pressure Boundary	Copper Alloy with 15% Zinc or More	Closed Cycle Cooling Water (External)	Cracking	Closed Treated Water Systems (B.2.1.13)			H, 3

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Lube Oil Cooler) Tube Sheet	Pressure Boundary	Copper Alloy with 15% Zinc or More	Closed Cycle Cooling Water (External)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	C
					Selective Leaching (B.2.1.22)	VII.C2.AP-43	3.3.1-72	C
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-133	3.3.1-99	C
					One-Time Inspection (B.2.1.21)	VII.H2.AP-133	3.3.1-99	C
Heat Exchanger - (Lube Oil Cooler) Tube Side Components	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.H2.AP-41	3.3.1-80	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
Heat Exchanger - (Lube Oil Cooler) Tubes	Heat Transfer	Aluminum Alloy	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-154	3.3.1-101	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-154	3.3.1-101	A
		Copper Alloy with 15% Zinc or More	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-205	3.3.1-50	A
			Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-78	3.2.1-51	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-78	3.2.1-51	A
	Pressure Boundary	Copper Alloy with 15% Zinc or More	Closed Cycle Cooling Water (Internal)	Cracking	Closed Treated Water Systems (B.2.1.13)			H, 3
				Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	C
					Selective Leaching (B.2.1.22)	VII.C2.AP-43	3.3.1-72	C

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Lube Oil Cooler) Tubes	Pressure Boundary	Copper Alloy with 15% Zinc or More	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-133	3.3.1-99	C
					One-Time Inspection (B.2.1.21)	VII.H2.AP-133	3.3.1-99	C
Hoses	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
		Elastomers	Air - Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.AP-102	3.3.1-76	A
			Condensation (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-136	3.3.1-71	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-136	3.3.1-71	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-105	3.3.1-70	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Fuel Oil (Internal)	None	None	VII.J.AP-49	3.3.1-117	A
	Pressure Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-142	3.3.1-92	A
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-78	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
			Diesel Exhaust (Internal)	Cumulative Fatigue Damage	TLAA			H, 1

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.AP-104	3.3.1-88	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-105	3.3.1-70	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-127	3.3.1-97	A
			Soil (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.H1.AP-198	3.3.1-106	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Closed Cycle Cooling Water (Internal)	Cracking	Closed Treated Water Systems (B.2.1.13)			H, 3
				Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	A
					Selective Leaching (B.2.1.22)	VII.C2.AP-43	3.3.1-72	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Copper Alloy with less than 15% Zinc	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-132	3.3.1-69	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-132	3.3.1-69	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Closed Cycle Cooling Water (Internal)	None	None	VII.J.AP-166	3.3.1-117	A
			Condensation (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
			Lubricating Oil (Internal)	None	None	VII.J.AP-15	3.3.1-117	A
		Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-127	3.3.1-97	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-136	3.3.1-71	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-136	3.3.1-71	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-138	3.3.1-100	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-138	3.3.1-100	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
Pump Casing (Fuel Oil Transfer)	Pressure Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-105	3.3.1-70	A
Pump Casing (Lube Oil)	Pressure Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-127	3.3.1-97	A
Silencer/Muffler	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Silencer/Muffler	Pressure Boundary	Carbon Steel	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.AP-104	3.3.1-88	A
Strainer Element	Filter	Stainless Steel	Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A
			Fuel Oil (External)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-136	3.3.1-71	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-136	3.3.1-71	A
			Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-138	3.3.1-100	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-138	3.3.1-100	A
Tanks (Air Receivers)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
Tanks (Closed Cooling Water Expansion Tanks)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
Tanks (Fuel Oil Storage and Day Tanks)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (Fuel Oil Storage and Day Tanks)	Pressure Boundary	Carbon Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-105	3.3.1-70	A
Tanks (Lube Oil Strainer Tank)	Pressure Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-142	3.3.1-92	C
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-162	3.3.1-99	C
					One-Time Inspection (B.2.1.21)	VII.H2.AP-162	3.3.1-99	C
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-127	3.3.1-97	C
					One-Time Inspection (B.2.1.21)	VII.H2.AP-127	3.3.1-97	C
Valve Body	Leakage Boundary	Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-105	3.3.1-70	A
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Closed Cycle Cooling Water (Internal)	Cracking	Closed Treated Water Systems (B.2.1.13)			H, 3
				Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	A
					Selective Leaching (B.2.1.22)	VII.C2.AP-43	3.3.1-72	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.19)	VII.H1.AP-132	3.3.1-69	A
					One-Time Inspection (B.2.1.21)	VII.H1.AP-132	3.3.1-69	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-133	3.3.1-99	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-138	3.3.1-100	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-138	3.3.1-100	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A

Table 3.3.2-8 Diesel Generator and Auxiliaries System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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 component is associated with carbon steel EDG engine exhaust piping in a diesel exhaust environment. TLAA is used to manage the aging effect(s) applicable to this component type, material and environment combination. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

2. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3. The aging effects for copper alloy with 15% zinc or more in a closed cycle cooling water environment include cracking. The Closed Treated Water Systems (B.2.1.13) program is used to manage cracking for this component, material, and environment combination.

Table 3.3.2-9
Drywell Pneumatic System
Summary of Aging Management Evaluation

Table 3.3.2-9 Drywell Pneumatic System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Accumulator	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	C
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	D, 1
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Compressor Housing	Leakage Boundary	Ductile Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
		Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
					Selective Leaching (B.2.1.22)	VII.C2.A-50	3.3.1-72	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.F1.AP-127	3.3.1-97	A

Table 3.3.2-9 Drywell Pneumatic System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Compressor Housing	Leakage Boundary	Gray Cast Iron	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.F1.AP-127	3.3.1-97	A
Hoses	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A, 2
	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	B, 1
Piping, piping components, and piping elements	Leakage Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-142	3.3.1-92	A, 2
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.A-08	3.3.1-90	C, 2
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.F1.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.21)	VII.F1.AP-127	3.3.1-97	A
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A

Table 3.3.2-9 Drywell Pneumatic System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Copper Alloy with 15% Zinc or More	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A, 2
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-272	3.3.1-95	A, 5
					Selective Leaching (B.2.1.22)	VII.E5.A-407	3.3.1-72	A, 5
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-133	3.3.1-99	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Lubricating Oil (Internal)	None	None	VII.J.AP-15	3.3.1-117	A
		Nickel Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-16	3.3.1-118	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-274	3.3.1-95	A, 2
		Polymers	Air - Indoor Uncontrolled (External)	Change in Material Properties	External Surfaces Monitoring of Mechanical Components (B.2.1.24)			G, 3
			Condensation (Internal)	Change in Material Properties, Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 4

Table 3.3.2-9 Drywell Pneumatic System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	B, 1
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A, 2
	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	B, 1
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A, 2
	Structural Integrity	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	B, 1
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A, 2
Strainer Element	Filter	Stainless Steel	Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.A-08	3.3.1-90	C, 2

Table 3.3.2-9 Drywell Pneumatic System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-133	3.3.1-99	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	B, 1
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A, 2
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	B, 1
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A, 2
	Structural Integrity	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	B, 1

Table 3.3.2-9 Drywell Pneumatic System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. SSCs downstream of N2 compressors/dryers have an internal environment of condensation which will be managed by the Compressed Air Monitoring (B.2.1.15) program.

2. SSCs upstream of the compressors/dryers, and, portions of drain traps and their associated piping components and piping elements have an internal environment of condensation which will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program.

3. Material is translucent epoxy fiberglass. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage the aging effect applicable to this component type, material, and environment combination.

4. Material is translucent epoxy fiberglass. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage the aging effect applicable to this component type, material, and environment combination.

5. Water accumulated in drain traps is considered waste water for the purposes of assigning aging effects and aging management programs.

Table 3.3.2-10

Electrical Penetration Pressurization System

Summary of Aging Management Evaluation

Table 3.3.2-10 Electrical Penetration Pressurization System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A

Table 3.3.2-10 Electrical Penetration Pressurization System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

Table 3.3.2-11
Essential Cooling Water System
Summary of Aging Management Evaluation

Table 3.3.2-11 Essential Cooling Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
			Air - Outdoor (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-126	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-263	3.3.1-15	A
Fish Barrier	Filter	Stainless Steel	Air - Outdoor (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	III.B2.TP-6	3.5.1-93	E, 2
			Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
Flow Device	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
	Throttle	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
Heat Exchanger - (CSCS Equipment Area Cubicle Coolers) Tubes	Heat Transfer	Copper Alloy with less than 15% Zinc	Raw Water (Internal)	Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-72	3.3.1-42	A

Table 3.3.2-11 Essential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (CSCS Equipment Area Cubicle Coolers) Tubes	Pressure Boundary	Copper Alloy with less than 15% Zinc	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-179	3.3.1-38	A
Heat Exchanger - (D/G Cooler) Tube Sheet	Pressure Boundary	Copper Alloy with 15% Zinc or More (with internal coating)	Raw Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 3
				Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-179	3.3.1-38	A
					Selective Leaching (B.2.1.22)	VII.C1.A-66	3.3.1-72	A
Heat Exchanger - (D/G Cooler) Tube Side Components	Pressure Boundary	Carbon Steel (with internal coating)	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 4
				Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-194	3.3.1-37	C
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-179	3.3.1-38	A
					Selective Leaching (B.2.1.22)	VII.C1.A-66	3.3.1-72	A

Table 3.3.2-11 Essential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (D/G Cooler) Tube Side Components	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	C
Heat Exchanger - (D/G Cooler) Tubes	Heat Transfer	Copper Alloy with 15% Zinc or More	Raw Water (Internal)	Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-72	3.3.1-42	A
	Pressure Boundary	Copper Alloy with 15% Zinc or More	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-179	3.3.1-38	A
					Selective Leaching (B.2.1.22)	VII.C1.A-66	3.3.1-72	A
Heat Exchanger - (LPCS Pump Motor Cooler) Shell Side Components	Pressure Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-131	3.3.1-98	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-131	3.3.1-98	A
Heat Exchanger - (LPCS Pump Motor Cooler) Tube Side Components	Pressure Boundary	Stainless Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.C2.AP-138	3.3.1-100	C
					One-Time Inspection (B.2.1.21)	VII.C2.AP-138	3.3.1-100	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	C
Heat Exchanger - (LPCS Pump Motor Cooler) Tubes	Heat Transfer	Stainless Steel	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.26)	V.D2.EP-79	3.2.1-51	A
					One-Time Inspection (B.2.1.21)	V.D2.EP-79	3.2.1-51	A

Table 3.3.2-11 Essential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (LPCS Pump Motor Cooler) Tubes	Heat Transfer	Stainless Steel	Raw Water (Internal)	Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-187	3.3.1-42	A
	Pressure Boundary	Stainless Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.C2.AP-138	3.3.1-100	C
					One-Time Inspection (B.2.1.21)	VII.C2.AP-138	3.3.1-100	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	C
Heat Exchanger - (RHR Heat Exchanger) Tube Sheet	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	C
Heat Exchanger - (RHR Heat Exchanger) Tube Side Components	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	A
Heat Exchanger - (RHR Heat Exchanger) Tubes	Heat Transfer	Stainless Steel	Raw Water (Internal)	Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-187	3.3.1-42	A
	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	C
Heat Exchanger - (RHR Pump Seal Cooler) Shell Side Components	Pressure Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	A

Table 3.3.2-11 Essential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (RHR Pump Seal Cooler) Shell Side Components	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Selective Leaching (B.2.1.22)	VII.C1.A-51	3.3.1-72	C
Heat Exchanger - (RHR Pump Seal Cooler) Tube Side Components	Pressure Boundary	Stainless Steel	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	D
Heat Exchanger - (RHR Pump Seal Cooler) Tubes	Heat Transfer	Stainless Steel	Raw Water (External)	Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-187	3.3.1-42	A
			Treated Water (Internal)	Reduction of Heat Transfer	One-Time Inspection (B.2.1.21)	VII.E3.AP-139	3.3.1-27	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-139	3.3.1-27	B
	Pressure Boundary	Stainless Steel	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	D
Hoses	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A

Table 3.3.2-11 Essential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
						VII.C1.A-400	3.3.1-127	E, 5
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.H1.A-24	3.3.1-80	E, 1
			Concrete (External)	None	None	VII.J.AP-282	3.3.1-112	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
						VII.C1.A-400	3.3.1-127	E, 5
			Soil (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.G.AP-198	3.3.1-106	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6

Table 3.3.2-11 Essential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
Pump Casing (D/G Cooling Water 0DG01P)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-123	3.3.1-120	A
			Condensation (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
Pump Casing (D/G Cooling Water 1DG01P/2DG01P)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
Pump Casing (Fuel Pool Emergency Makeup)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
		Carbon or Low Alloy Steel with Stainless Steel Cladding	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A

Table 3.3.2-11 Essential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (HPCS D/G Cooling Water)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
Pump Casing (RHR Service Water)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
Strainer Body	Pressure Boundary	Carbon Steel (with internal coating)	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 4
				Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-194	3.3.1-37	A

Table 3.3.2-11 Essential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Strainer Body	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
Strainer Element	Filter	Stainless Steel	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.H1.A-24	3.3.1-80	E, 1
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6

Table 3.3.2-11 Essential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 6
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A

Table 3.3.2-11 Essential Cooling Water System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The Buried and Underground Piping (B.2.1.28) program is substituted to manage the aging effect applicable to this component type, material, and environment combination.

2. The Open-Cycle Cooling Water System (B.2.1.12) program is substituted to manage the aging effect applicable to this component type, material, and environment combination.

3. The aging effects for copper alloy (ASTM SB-171) with 15% zinc or more (with internal coating) in a raw water environment include loss of coating integrity. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) is used to manage the identified aging effect applicable to copper alloy with 15% zinc or more (with internal coating) in a raw water environment.

4. The aging effects for carbon steel (D/G cooler channel shell SA-106 Gr. B, channel flanges SA-285 Gr. C, channel covers SA-285, nozzle flanges SA-181/SA-105; strainer body carbon steel) with internal coating in a raw water environment include loss of coating integrity. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) is used to manage the identified aging effect applicable to carbon steel (with internal coating) in a raw water environment.

Table 3.3.2-11 Essential Cooling Water System (Continued)

Plant Specific Notes: (continued)

5. NUREG-1801, as amended by LR-ISG-2012-02, specifies a plant-specific program. The Open-Cycle Cooling Water System (B.2.1.12) program is used to manage the aging effect applicable to this component type, material, and environment combination.

6. These components are in an air-indoor, uncontrolled environment, and are insulated. Because of the potential for air in-leakage through minor gaps in insulation, condensation can occur underneath the insulation on components when the operating temperature of the component is below the dew point of the air on the external surfaces of the insulation.

Table 3.3.2-12
Fire Protection System
Summary of Aging Management Evaluation

Table 3.3.2-12 Fire Protection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
			Raw Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.G.A-33	3.3.1-64	E, 1
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-264	3.3.1-15	A
			Soil (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.I.AP-241	3.3.1-109	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-242	3.3.1-14	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Fire Barriers (Damper Housing)	Fire Barrier	Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Condensation (Internal)	Loss of Material	Fire Protection (B.2.1.16)	VII.F1.A-08	3.3.1-90	E, 10
Fire Barriers (Doors)	Fire Barrier	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	Fire Protection (B.2.1.16)	VII.I.A-77	3.3.1-78	E, 2
						VII.G.A-21	3.3.1-59	A
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Air - Outdoor (External)	Loss of Material	Fire Protection (B.2.1.16)	VII.I.A-78	3.3.1-78	E, 2
						VII.G.A-22	3.3.1-59	A
Fire Barriers (For Steel Components)	Fire Barrier	Aluminum Silicate	Air - Indoor Uncontrolled (External)	Cracking	Fire Protection (B.2.1.16)			F, 3

Table 3.3.2-12 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Fire Barriers (For Steel Components)	Fire Barrier	Ceramic Fiber	Air - Indoor Uncontrolled (External)	None	Fire Protection (B.2.1.16)			F, 4
		Pyrocrete	Air - Indoor Uncontrolled (External)	Cracking	Fire Protection (B.2.1.16)			F, 3
Fire Barriers (Penetration Seals and Fire Stops)	Fire Barrier	Calcium Silicate	Air - Indoor Uncontrolled (External)	None	Fire Protection (B.2.1.16)			F, 4
		Ceramic Fiber	Air - Indoor Uncontrolled (External)	None	Fire Protection (B.2.1.16)			F, 4
		Elastomers	Air - Indoor Uncontrolled (External)	Change in Material Properties	Fire Protection (B.2.1.16)	VII.G.A-19	3.3.1-57	A
		Grout	Air - Indoor Uncontrolled (External)	Cracking	Fire Protection (B.2.1.16)	VII.G.A-90	3.3.1-60	A, 5
					Structures Monitoring (B.2.1.34)	VII.G.A-90	3.3.1-60	A, 5
		Gypsum	Air - Indoor Uncontrolled (External)	Cracking	Fire Protection (B.2.1.16)			F, 3
		Mineral Fiber	Air - Indoor Uncontrolled (External)	None	Fire Protection (B.2.1.16)			F, 4
Fire Barriers (Walls and Slabs)	Fire Barrier	Concrete Block	Air - Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection (B.2.1.16)	VII.G.A-90	3.3.1-60	A
					Structures Monitoring (B.2.1.34)	VII.G.A-90	3.3.1-60	A
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
		Gypsum	Air - Indoor Uncontrolled (External)	Cracking	Fire Protection (B.2.1.16)			F, 3
		Reinforced Concrete	Air - Indoor Uncontrolled (External)	Concrete Cracking and Spalling	Fire Protection (B.2.1.16)	VII.G.A-90	3.3.1-60	A
					Structures Monitoring (B.2.1.34)	VII.G.A-90	3.3.1-60	A
				Loss of Material	Fire Protection (B.2.1.16)	VII.G.A-91	3.3.1-62	A

Table 3.3.2-12 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Fire Barriers (Walls and Slabs)	Fire Barrier	Reinforced Concrete	Air - Indoor Uncontrolled (External)	Loss of Material	Structures Monitoring (B.2.1.34)	VII.G.A-91	3.3.1-62	A
			Air - Outdoor (External)	Concrete Cracking and Spalling	Fire Protection (B.2.1.16)	VII.G.A-92	3.3.1-61	A
					Structures Monitoring (B.2.1.34)	VII.G.A-92	3.3.1-61	A
				Loss of Material	Fire Protection (B.2.1.16)	VII.G.A-93	3.3.1-62	A
					Structures Monitoring (B.2.1.34)	VII.G.A-93	3.3.1-62	A
Fire Hydrant	Pressure Boundary	Ductile Cast Iron	Air - Outdoor (External)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.AP-149	3.3.1-63	B
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-33	3.3.1-64	B
			Soil (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.G.AP-198	3.3.1-106	A
Hose Stations (Racks, Reels, and Supports)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
Hoses (Diesel Fire Pump)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-55	3.3.1-66	B
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-280	3.3.1-95	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Condensation (Internal)	None	None	VII.J.AP-97	3.3.1-117	A

Table 3.3.2-12 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
					Fire Protection (B.2.1.16)	VII.G.AP-150	3.3.1-58	A, 9
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-78	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
			Condensation (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-404	3.3.1-131	B
			Diesel Exhaust (Internal)	Cumulative Fatigue Damage	TLAA			H, 6
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.AP-104	3.3.1-88	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-33	3.3.1-64	B
						VII.G.A-400	3.3.1-127	E, 8
			Soil (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.G.AP-198	3.3.1-106	A
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-78	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-280	3.3.1-95	A

Table 3.3.2-12 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Galvanized Steel	Raw Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 7
				Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-33	3.3.1-64	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air - Indoor Uncontrolled (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-404	3.3.1-131	B
			Condensation (External)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-404	3.3.1-131	B
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-55	3.3.1-66	B
Pump Casing (Diesel Fire Pump)	Pressure Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (External)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-33	3.3.1-64	B
					Selective Leaching (B.2.1.22)	VII.G.A-51	3.3.1-72	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-33	3.3.1-64	B
					Selective Leaching (B.2.1.22)	VII.G.A-51	3.3.1-72	A
Pump Casing (Fire Intermediate Pump)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-55	3.3.1-66	B
Pump Casing (Fire Jockey Pump)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-12 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Fire Jockey Pump)	Pressure Boundary	Stainless Steel	Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-55	3.3.1-66	B
Spray Nozzles	Spray	Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-403	3.3.1-130	B
			Air - Outdoor (External)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-403	3.3.1-130	B
			Condensation (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-403	3.3.1-130	B
Sprinkler Heads	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-403	3.3.1-130	B
			Condensation (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-403	3.3.1-130	B
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-403	3.3.1-130	B
	Spray	Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-403	3.3.1-130	B
			Condensation (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-403	3.3.1-130	B
Strainer Element	Filter	Stainless Steel	Raw Water (External)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-55	3.3.1-66	B
Tanks (Cardox Storage)	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	Fire Protection (B.2.1.16)	VII.G.AP-150	3.3.1-58	A, 9
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	C
Tanks (Retard Chamber)	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	C
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.AP-197	3.3.1-64	D

Table 3.3.2-12 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (Retard Chamber)	Pressure Boundary	Ductile Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-33	3.3.1-64	D
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-280	3.3.1-95	A
	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-8	3.3.1-114	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.AP-197	3.3.1-64	B
		Ductile Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-33	3.3.1-64	B
		Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
					Fire Protection (B.2.1.16)	VII.G.AP-150	3.3.1-58	A, 9
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A

Table 3.3.2-12 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Gray Cast Iron	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-280	3.3.1-95	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.17)	VII.G.A-33	3.3.1-64	B
					Selective Leaching (B.2.1.22)	VII.G.A-51	3.3.1-72	A
			Soil (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.G.AP-198	3.3.1-106	A
					Selective Leaching (B.2.1.22)	VII.G.A-02	3.3.1-72	A

Table 3.3.2-12 Fire Protection System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect applicable to this component type, material, and environment combination. Inspection activities for bolting in a submerged environment are performed in conjunction with associated component maintenance activities.

2. The Fire Protection (B.2.1.16) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The visual periodic inspection of fire-rated doors is within the scope of the Fire Protection (B.2.1.16) program.

3. The Fire Protection (B.2.1.16) program will be used to manage the aging effect(s) applicable to this component type, material, and environment combination.

4. Based on plant operating experience, there are no aging effects requiring aging management for calcium silicate, ceramic fiber, and mineral fiber in an Air-Indoor Uncontrolled environment. These materials do not experience aging effects unless exposed to temperatures, radiation, or chemicals capable of attacking the specific chemical composition. These materials in this non-aggressive air environment are not expected to experience significant aging effects. Nonetheless, the Fire Protection (B.2.1.16) program is credited for assuring the absence of any aging effects.

Table 3.3.2-12 Fire Protection System (Continued)

Plant Specific Notes: (continued)

5. NUREG-1801 does not include grout fire barriers, however, grout is similar to concrete in terms of characteristics and is considered to be susceptible to the same aging effects and mechanisms as reinforced concrete. These aging effects and mechanisms are managed by the Fire Protection (B.2.1.16) and Structures Monitoring (B.2.1.34) programs.

6. This component is associated with carbon steel (ASTM A-106 Gr. B) diesel-driven fire pump engine exhaust piping in a diesel exhaust environment. TLAA is used to manage cumulative fatigue damage for this component type, material, and environment combination. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

7. The aging effects for galvanized steel (ASTM A-53 Gr. B) in a raw water environment include loss of coating integrity. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) is used to manage the identified aging effect applicable to galvanized steel in a raw water environment.

8. NUREG-1801, as amended by LR-ISG-2012-02, specifies a plant-specific program. The Fire Water System (B.2.1.17) program is used to manage the aging effect applicable to this component type, material, and environment combination.

9. The Fire Protection (B.2.1.16) program manages the external surfaces of carbon dioxide fire suppression system carbon steel piping, piping components, and piping elements and tanks exposed to an air - indoor uncontrolled (external) environment.

10. The Fire Protection (B.2.1.16) program is added to supplement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program in managing the aging effect(s) applicable to this component type, material, and environment combination. The damper housings for dampers with a fire barrier intended function are evaluated with the Fire Protection System and are inspected in accordance with Fire Protection (B.2.1.16) program requirements. Fire barrier damper housings located within the in scope boundary of the various ventilation systems also have a pressure boundary intended function and are inspected in accordance with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program. The pressure boundary intended function is evaluated with the various ventilation systems.

Table 3.3.2-13

Fuel Pool Cooling and Storage System

Summary of Aging Management Evaluation

Table 3.3.2-13 Fuel Pool Cooling and Storage System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Control Rod Blade Storage Racks	Structural Integrity	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A2.A-98	3.3.1-125	C
					Water Chemistry (B.2.1.2)	VII.A2.A-98	3.3.1-125	D
Fuel Storage Racks (Defective Fuel)	Structural Integrity	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A2.A-98	3.3.1-125	C
					Water Chemistry (B.2.1.2)	VII.A2.A-98	3.3.1-125	D
Fuel Storage Racks (New Fuel Storage)	Structural Integrity	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	C
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
Fuel Storage Racks (Unit 1 Spent Fuel)	Absorb Neutrons	Boral	Treated Water (External)	Reduction of Neutron Absorbing Capacity; Change in Dimensions and Loss of Material	Monitoring of Neutron-Absorbing Materials Other Than Boraflex (B.2.1.27)	VII.A2.AP-236	3.3.1-102	A
	Structural Integrity	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A2.A-98	3.3.1-125	A
					Water Chemistry (B.2.1.2)	VII.A2.A-98	3.3.1-125	B

Table 3.3.2-13 Fuel Pool Cooling and Storage System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Fuel Storage Racks (Unit 2 Spent Fuel)	Absorb Neutrons	Rio-Tinto Alcan Composite	Treated Water (External)	Reduction of Neutron Absorbing Capacity; Change in Dimensions and Loss of Material	Monitoring of Neutron-Absorbing Materials Other Than Boraflex (B.2.1.27)	VII.A2.AP-236	3.3.1-102	A
	Structural Integrity	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A2.A-98	3.3.1-125	A
					Water Chemistry (B.2.1.2)	VII.A2.A-98	3.3.1-125	B
Heat Exchanger - (Fuel Pool Cooling) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	D
Hoses	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Waste Water (Internal)	None	None	VII.J.AP-277	3.3.1-119	A

Table 3.3.2-13 Fuel Pool Cooling and Storage System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	B
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	B
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
Pump Casing (Fuel Pool Cooling Pump)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A

Table 3.3.2-13 Fuel Pool Cooling and Storage System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Fuel Pool Cooling Pump)	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
Strainer Element (Inside Skimmer Surge Tank)	Filter	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	D
Tanks (Skimmer Surge Tanks)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	D
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	B

Table 3.3.2-13 Fuel Pool Cooling and Storage System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	B

Table 3.3.2-13 Fuel Pool Cooling and Storage System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

Table 3.3.2-14
Nonessential Cooling Water System
Summary of Aging Management Evaluation

Table 3.3.2-14 Nonessential Cooling Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
			Raw Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.G.A-33	3.3.1-64	E, 2, 6
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-264	3.3.1-15	A, 2
	Structural Integrity	Carbon and Low Alloy Steel Bolting	Raw Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.G.A-33	3.3.1-64	E, 6
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-264	3.3.1-15	A
Heat Exchanger - (Aux Bldg. HVAC Condenser Unit) Tube Side Components	Leakage Boundary	Carbon Steel (with internal coating)	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 3
				Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-194	3.3.1-37	C

Table 3.3.2-14 Nonessential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Aux Bldg. HVAC Condenser Unit) Tubes	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-179	3.3.1-38	A
Heat Exchanger - (Counting Room HVAC Condenser Unit) Tube Side Components	Leakage Boundary	Carbon Steel (with internal coating)	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 3
				Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-194	3.3.1-37	C
Heat Exchanger - (Counting Room HVAC Condenser Unit) Tubes	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-179	3.3.1-38	A
Heat Exchanger - (Fuel Pool Cooling) Tube Side Components	Leakage Boundary	Carbon Steel (with internal coating)	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7

Table 3.3.2-14 Nonessential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Fuel Pool Cooling) Tube Side Components	Leakage Boundary	Carbon Steel (with internal coating)	Raw Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 3
				Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-194	3.3.1-37	C
Heat Exchanger - (Primary Containment Ventilation Chiller Service Water Condenser) Tube Side Components	Leakage Boundary	Carbon Steel (with internal coating)	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 3
				Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-194	3.3.1-37	C
Heat Exchanger - (Primary Containment Ventilation Chiller Service Water Condenser) Tubes	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-179	3.3.1-38	A

Table 3.3.2-14 Nonessential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Process Computer Room A/C Unit) Tube Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	A
Heat Exchanger - (Process Computer Room A/C Unit) Tubes	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-179	3.3.1-38	A
Heat Exchanger - (Reactor Building Closed Cooling Water Heat Exchanger) Tube Side Components	Leakage Boundary	Carbon Steel (with internal coating)	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 3
				Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-194	3.3.1-37	C
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-14 Nonessential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
						VII.C1.A-400	3.3.1-127	E, 4
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
	Pressure Boundary	Aluminum Alloy	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.G.AP-180	3.3.1-65	E, 1
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.G.AP-180	3.3.1-65	E, 1
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.H1.A-24	3.3.1-80	E, 5
					External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A
			Concrete (External)	None	None	VII.J.AP-282	3.3.1-112	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7

Table 3.3.2-14 Nonessential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
						VII.C1.A-400	3.3.1-127	E, 4
			Soil (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.C3.AP-198	3.3.1-106	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
Pump Casing (Service Water)	Pressure Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
					Selective Leaching (B.2.1.22)	VII.C1.A-51	3.3.1-72	A
Tanks (Clean Gland Water)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
Traveling Water Screen Framework	Structural Integrity	Carbon Steel (with external coating)	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-194	3.3.1-37	C
		Gray Cast Iron	Concrete (External)	None	None	VII.J.AP-282	3.3.1-112	C

Table 3.3.2-14 Nonessential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Traveling Water Screen Framework	Structural Integrity	Gray Cast Iron	Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
					Selective Leaching (B.2.1.22)	VII.C1.A-51	3.3.1-72	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-196	3.3.1-36	A
		Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
					Selective Leaching (B.2.1.22)	VII.C1.A-51	3.3.1-72	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7

Table 3.3.2-14 Nonessential Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VII.H1.A-24	3.3.1-80	E, 5
					External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 7
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
		Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
					Selective Leaching (B.2.1.22)	VII.C1.A-51	3.3.1-72	A

Table 3.3.2-14 Nonessential Cooling Water System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The Open Cycle Cooling Water System (B.2.1.12) program is substituted to manage the aging effect applicable to this component type, material, and environment combination.
2. Components in the Raw Water (External) environment are associated with the Service Water pump suction line safety barrier.
3. The aging effects for carbon steel (with internal coating) in a raw water environment include loss of coating integrity. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) is used to manage the identified aging effect applicable to carbon steel (with internal coating) in a raw water environment.
4. NUREG-1801, as amended by LR-ISG-2012-02, specifies a plant-specific program. The Open-Cycle Cooling Water System (B.2.1.12) program is used to manage the aging effect applicable to this component type, material, and environment combination.
5. The Buried and Underground Piping (B.2.1.28) program is substituted to manage the aging effect applicable to this component type, material, and environment combination.
6. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect applicable to this component type, material, and environment combination.
7. These components are in an air-indoor, uncontrolled environment, and are insulated. Because of the potential for air in-leakage through minor gaps in insulation, condensation can occur underneath the insulation on components when the operating temperature of the component is below the dew point of the air on the external surfaces of the insulation.

Table 3.3.2-15
Nonsafety-Related Ventilation System
Summary of Aging Management Evaluation

Table 3.3.2-15 Nonsafety-Related Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Heat Exchanger - (Primary Containment Vent Chiller Glycol Condenser) Tube Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 2
Heat Exchanger - (Primary Containment Vent Chiller Glycol Condenser) Tubes	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	C

Table 3.3.2-15 Nonsafety-Related Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Reactor Bldg., Turb Bldg., Switchgear Rm Supply and Exhaust Coils) Tube Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	A
Heat Exchanger - (Reactor Bldg., Turb Bldg., Switchgear Rm Supply and Exhaust Coils) Tubes	Leakage Boundary	Copper Alloy with less than 15% Zinc	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	C
			Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	C, 1
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 2
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Closed Cycle Cooling Water (Internal)	None	None	VII.J.AP-166	3.3.1-117	A
			Condensation (Internal)	None	None	VII.J.AP-97	3.3.1-117	A

Table 3.3.2-15 Nonsafety-Related Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
Pump Casing (Heat Recovery Transfer Pumps, Fill Pump, Make-up Tank Pump, Heat Coil Drain Pump)	Leakage Boundary	Ductile Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 2
Tanks (Glycol Electric Heaters)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
Tanks (Heat Recovery System Expansion Tank)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	C
Tanks (Heat Recovery System Make-up Tank)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A

Table 3.3.2-15 Nonsafety-Related Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (Heat Recovery System Make-up Tank)	Leakage Boundary	Carbon Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.C1.A-405	3.3.1-132	A, 2

Table 3.3.2-15 Nonsafety-Related Ventilation System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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 component is located internal to a heat exchanger, and therefore the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the applicable aging effects.

2. These components are in an air-indoor, uncontrolled environment, and are insulated. Because of the potential for air in-leakage through minor gaps in insulation, condensation can occur underneath the insulation on components when the operating temperature of the component is below the dew point of the air on the external surfaces of the insulation.

Table 3.3.2-16
Plant Drainage System
Summary of Aging Management Evaluation

Table 3.3.2-16 Plant Drainage System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Heat Exchanger - (Drywell Equipment Drain Sump Heat Exchanger) Tube Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	C
Heat Exchanger - (Reactor Building Equipment Drain Tank Heat Exchanger) Tube Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	C
Hoses	Leakage Boundary	Polymers	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-268	3.3.1-119	A
			Waste Water (Internal)	None	None			G, 1
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-16 Plant Drainage System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hoses	Leakage Boundary	Stainless Steel	Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
						VII.E5.A-400	3.3.1-127	E, 2
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-272	3.3.1-95	A
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	A
			Waste Water (Internal)	Loss of Coating Integrity	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)			H, 3
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
						VII.E5.A-400	3.3.1-127	E, 2
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Waste Water (Internal)	None	None	VII.J.AP-277	3.3.1-119	A

Table 3.3.2-16 Plant Drainage System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Concrete (External)	None	None	VII.J.AP-282	3.3.1-112	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
						VII.E5.A-400	3.3.1-127	E, 2
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-272	3.3.1-95	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
Pump Casing (Drywell Floor and Drywell Equipment Drain Pumps)	Leakage Boundary	Ductile Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-16 Plant Drainage System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Drywell Floor and Drywell Equipment Drain Pumps)	Leakage Boundary	Ductile Cast Iron	Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
Pump Casing (Reactor Building Equipment Drain Pump)	Leakage Boundary	Ductile Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
Pump Casing (Sump Pumps)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
Tanks (Gland Seal Leakoff Reservoir)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-280	3.3.1-95	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
Tanks (Reactor Building Equipment Drain Tank)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-16 Plant Drainage System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (Reactor Building Equipment Drain Tank)	Leakage Boundary	Carbon Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-280	3.3.1-95	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A

Table 3.3.2-16 Plant Drainage System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Some system drains include polymer hoses (Tygon® tubing). Tygon® tubing has no aging effects in a Waste Water environment. Tygon® is a registered trademark of Norton Performance Plastics that represents a family of various thermoplastic polymers. Tygon® is a PVC-based material that is clear or transparent and normally used for flexible tubing. It is considered non-aging and non-oxidizing, and has broad chemical resistance.

2. NUREG-1801, as amended by LR-ISG-2012-02, specifies a plant-specific program. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the aging effect applicable to this component type, material, and environment combination.

3. The aging effects for galvanized steel in a waste water environment include loss of coating integrity. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) is used to manage the identified aging effect applicable to galvanized steel in a waste water environment.

Table 3.3.2-17

Primary Containment Ventilation System

Summary of Aging Management Evaluation

Table 3.3.2-17 Primary Containment Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Ducting and Components	Leakage Boundary	Stainless Steel	Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	A, 1
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C
Heat Exchanger - (Primary Containment Vent Chiller Compressor Oil Cooler) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F3.AP-41	3.3.1-80	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-189	3.3.1-46	A
Heat Exchanger - (Primary Containment Vent Chiller Evaporator) Tube Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-189	3.3.1-46	A

Table 3.3.2-17 Primary Containment Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Primary Containment Vent Chiller Evaporator) Tubes	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-203	3.3.1-46	A
Heat Exchanger - (Primary Containment Ventilation HX and Drywell Area Cooler) Tubes	Leakage Boundary	Copper Alloy with less than 15% Zinc	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-203	3.3.1-46	A
			Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	C, 2
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.A-405	3.3.1-132	A, 3
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-133	3.3.1-99	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-17 Primary Containment Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.A-405	3.3.1-132	A, 3
Pump Casing (Primary Containment Chilled Water Pumps)	Leakage Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A
					Selective Leaching (B.2.1.22)	VII.F3.A-50	3.3.1-72	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.A-405	3.3.1-132	A, 3
Tanks (Chilled Water Holdup and Expansion Tanks, Chilled Water Chemical Feeders)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.A-405	3.3.1-132	A, 3

Table 3.3.2-17 Primary Containment Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (Chilled Water Holdup and Expansion Tanks, Chilled Water Chemical Feeders)	Leakage Boundary	Carbon Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.H2.A-23	3.3.1-89	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.A-405	3.3.1-132	A, 3
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.26)	VII.H2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.21)	VII.H2.AP-133	3.3.1-99	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F1.A-405	3.3.1-132	A, 3
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-17 Primary Containment Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A

Table 3.3.2-17 Primary Containment Ventilation System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The stainless steel drip pan is located internal to the ventilation ductwork, and therefore the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the applicable aging effects.

2. This component is located internal to a heat exchanger, and therefore the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the applicable aging effects.

3. These components are in an air-indoor, uncontrolled environment, and are insulated. Because of the potential for air in-leakage through minor gaps in insulation, condensation can occur underneath the insulation on components when the operating temperature of the component is below the dew point of the air on the external surfaces of the insulation.

Table 3.3.2-18
Process Radiation Monitoring System
Summary of Aging Management Evaluation

Table 3.3.2-18 Process Radiation Monitoring System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Hoses	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A

Table 3.3.2-18 Process Radiation Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-280	3.3.1-95	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Condensation (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A
	Structural Integrity	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A
Pump Casing (SGTS and SVS Wide Range Sample Pumps)	Pressure Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-142	3.3.1-92	A

Table 3.3.2-18 Process Radiation Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (RHR Service Water Sample Pumps)	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
Pump Casing (SGTS Vent Monitor 0PL058 Sample Pumps)	Structural Integrity	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-142	3.3.1-92	A
Pump Casing (Sample Pumps - Radwaste, Service Water, RBCCW)	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-196	3.3.1-36	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-272	3.3.1-95	A
Valve Body	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A

Table 3.3.2-18 Process Radiation Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A
	Structural Integrity	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	A

Table 3.3.2-18 Process Radiation Monitoring System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

Table 3.3.2-19
Process Sampling and Post Accident Monitoring System
Summary of Aging Management Evaluation

Table 3.3.2-19 Process Sampling and Post Accident Monitoring System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Compressor Housing	Structural Integrity	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C
Flow Device	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A, 1
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B

Table 3.3.2-19 Process Sampling and Post Accident Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Flow Device	Throttle	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A, 1
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Condensation (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
			Treated Water (Internal)	None	None	VII.J.AP-51	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C

Table 3.3.2-19 Process Sampling and Post Accident Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Pressure Boundary	Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-98	3.3.1-117	A
			Condensation (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A, 1
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B
	Structural Integrity	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C

Table 3.3.2-19 Process Sampling and Post Accident Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (H2/O2 Sample Pumps)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C
Pump Casing (HRSS Room Sump Pump)	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
Pump Casing (HRSS Sample Pump)	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
Pump Casing (HRSS Waste Pumps)	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
Tanks (HRSS Waste Tank)	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A

Table 3.3.2-19 Process Sampling and Post Accident Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-202	3.3.1-45	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-272	3.3.1-95	A
					Selective Leaching (B.2.1.22)	VII.E5.A-407	3.3.1-72	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	A
	Pressure Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A

Table 3.3.2-19 Process Sampling and Post Accident Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Aluminum Alloy	Air/Gas - Dry (Internal)	None	None	VII.J.AP-37	3.3.1-113	A
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-9	3.3.1-114	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B
	Structural Integrity	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F3.AP-99	3.3.1-94	C

Table 3.3.2-19 Process Sampling and Post Accident Monitoring System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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 in the Treated Water (External) environment are associated with instrument sensing lines located below the normal water level in the suppression pool.

Table 3.3.2-20
Radwaste System
Summary of Aging Management Evaluation

Table 3.3.2-20 Radwaste System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	B
Pump Casing (Cleanup Phase Separator Sludge Pump)	Leakage Boundary	Ductile Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B

Table 3.3.2-20 Radwaste System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (RWCU Cleanup Phase Separators)	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	D
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	B

Table 3.3.2-20 Radwaste System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

Table 3.3.2-21
Reactor Water Cleanup System
Summary of Aging Management Evaluation

Table 3.3.2-21 Reactor Water Cleanup System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Heat Exchanger - (Clean-Up Regenerative Heat Exchangers) Shell Side Components	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VII.E3.AP-120	3.3.1-19	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	B
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	D
Heat Exchanger - (Clean-Up Regenerative Heat Exchangers) Tube Side Components	Leakage Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VII.E3.AP-120	3.3.1-19	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	B
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	D

Table 3.3.2-21 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (Clean-Up Regenerative Heat Exchangers) Tube Side Components	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VII.E3.AP-120	3.3.1-19	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	B
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	D
Heat Exchanger - (Clean-up Non-Regenerative Heat Exchanger) Tube Side Components	Leakage Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VII.E3.AP-112	3.3.1-20	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	B
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	D
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VII.E3.AP-112	3.3.1-20	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	B
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	D

Table 3.3.2-21 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (RWCU Pump Heat Exchanger) Shell Side Components	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	D
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Treated Water (Internal)	None	None	VII.J.AP-51	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	B
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VII.E3.AP-120	3.3.1-19	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	D

Table 3.3.2-21 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Treated Water > 140 F (Internal)	Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	B
Pump Casing (Clean-Up Filter Demineralizer Holding Pump)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B
Pump Casing (Clean-Up Filter Demineralizer Precoat Pump)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-21 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Clean-Up Filter Demineralizer Precoat Pump)	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B
Pump Casing (Reactor Water Clean-Up Recirculation Pump)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B
Tanks (Clean-Up Filter Demineralizer Precoat Tank)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	D
Tanks (Clean-Up Filter Demineralizer)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	D
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A

Table 3.3.2-21 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	B
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VII.E3.AP-120	3.3.1-19	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	D
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-09	3.2.1-11	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	B

Table 3.3.2-21 Reactor Water Cleanup System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.3.2-22
Safety-Related Ventilation System
Summary of Aging Management Evaluation

Table 3.3.2-22 Safety-Related Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
Ducting and Components	Leakage Boundary	Stainless Steel	Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F2.AP-99	3.3.1-94	A, 1
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C
	Pressure Boundary	Aluminum Alloy	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F2.AP-142	3.3.1-92	C
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F2.A-10	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F2.A-08	3.3.1-90	A
		Elastomers	Air - Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F2.AP-102	3.3.1-76	A

Table 3.3.2-22 Safety-Related Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Ducting and Components	Pressure Boundary	Elastomers	Condensation (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2
		Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F4.A-08	3.3.1-90	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F2.AP-99	3.3.1-94	A
Flexible Connection	Pressure Boundary	Elastomers	Air - Indoor Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F2.AP-102	3.3.1-76	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.F2.AP-113	3.3.1-82	A
			Condensation (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 2
Heat Exchanger - (CSCS Equipment Area Cubicle Coolers) Fins	Heat Transfer	Aluminum Alloy	Condensation (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 3

Table 3.3.2-22 Safety-Related Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger - (CSCS Equipment Area Cubicle Coolers) Shell Side Components	Pressure Boundary	Galvanized Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F4.A-08	3.3.1-90	C
Heat Exchanger - (CSCS Equipment Area Cubicle Coolers) Tubes	Heat Transfer	Copper Alloy with less than 15% Zinc	Condensation (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)			G, 3
	Pressure Boundary	Copper Alloy with less than 15% Zinc	Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	C, 4
Piping, piping components, and piping elements	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
Valve Body	Pressure Boundary	Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A

Table 3.3.2-22 Safety-Related Ventilation System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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 component is located internal to the ventilation ductwork, and therefore the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the applicable aging effects.

2. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the reduction of heat transfer aging effect applicable to this component type, material, and environment combination. The component is located within HVAC ducting and components, and the external surfaces of this component are subject to the internal HVAC environment of condensation during normal operation. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program performs visual inspections which are capable of identifying aging mechanisms which cause reduction of heat transfer.

4. This component is located internal to a heat exchanger, and therefore the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program is used to manage the applicable aging effects.

Table 3.3.2-23
Standby Liquid Control System
Summary of Aging Management Evaluation

Table 3.3.2-23 Standby Liquid Control System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-281	3.3.1-91	A
		Copper Alloy with 15% Zinc or More	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.AP-143	3.3.1-89	A
			Treated Water (Internal)	Cracking	One-Time Inspection (B.2.1.21)			H, 2
					Water Chemistry (B.2.1.2)			H, 2
				Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-140	3.3.1-22	B

Table 3.3.2-23 Standby Liquid Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Copper Alloy with 15% Zinc or More	Treated Water (Internal)	Loss of Material	Selective Leaching (B.2.1.22)	VII.E4.AP-32	3.3.1-72	A
		Glass	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Condensation (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
			Sodium Pentaborate Solution (Internal)	None	None			G, 1
			Treated Water (Internal)	None	None	VII.J.AP-51	3.3.1-117	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E2.AP-141	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	B
	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E2.AP-141	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	A

Table 3.3.2-23 Standby Liquid Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	B
	Structural Integrity	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.I.A-77	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.G.A-23	3.3.1-89	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
Pump Casing (SLC Pump)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	B
Tanks (SLC Solution Tank)	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	C
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E2.AP-141	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	D
Tanks (SLC Test Tank)	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C

Table 3.3.2-23 Standby Liquid Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (SLC Test Tank)	Leakage Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	D
Valve Body	Leakage Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	B
	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E2.AP-141	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	B
	Structural Integrity	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-23 Standby Liquid Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Structural Integrity	Stainless Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	V.D2.EP-61	3.2.1-48	A

Table 3.3.2-23 Standby Liquid Control System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Glass in a sodium pentaborate solution environment has no applicable aging effects requiring management.
2. The aging effects for copper alloy with 15% zinc or more in a treated water environment include cracking. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program are used to manage cracking for copper alloy with 15% zinc or more in a treated water environment.

Table 3.3.2-24
Suppression Pool Cleanup System
Summary of Aging Management Evaluation

Table 3.3.2-24 Suppression Pool Cleanup System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-125	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-124	3.3.1-15	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	B
Pump Casing (Suppression Pool Cleanup Pump)	Leakage Boundary	Gray Cast Iron	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B
					Selective Leaching (B.2.1.22)	VII.E4.AP-31	3.3.1-72	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VII.D.A-80	3.3.1-78	A

Table 3.3.2-24 Suppression Pool Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	B

Table 3.3.2-24 Suppression Pool Cleanup System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

Table 3.3.2-25
Traversing Incore Probe System
Summary of Aging Management Evaluation

Table 3.3.2-25 Traversing Incore Probe System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	B
Valve Body	Pressure Boundary	Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Condensation (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	B

Table 3.3.2-25 Traversing Incore Probe System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEM

3.4.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.4, Steam and Power Conversion System, 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.

- Condensate System (2.3.4.1)
- Condenser and Air Removal System (2.3.4.2)
- Feedwater System (2.3.4.3)
- Main Steam System (2.3.4.4)
- Main Turbine and Auxiliaries System (2.3.4.5)

3.4.2 RESULTS

The following tables summarize the results of the aging management review for Steam and Power Conversion System.

Table 3.4.2-1 Condensate System - Summary of Aging Management Evaluation

Table 3.4.2-2 Condenser and Air Removal System - Summary of Aging Management Evaluation

Table 3.4.2-3 Feedwater System - Summary of Aging Management Evaluation

Table 3.4.2-4 Main Steam System - Summary of Aging Management Evaluation

Table 3.4.2-5 Main Turbine and Auxiliaries System - Summary of Aging Management Evaluation

3.4.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Management Programs

3.4.2.1.1 Condensate System

Materials

The materials of construction for the Condensate System components are:

- Aluminum Alloy
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with less than 15% Zinc
- Stainless Steel

Environments

The Condensate System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Condensation
- Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Condensate System components require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Condensate System components:

- Aboveground Metallic Tanks (B.2.1.18)
- Bolting Integrity (B.2.1.11)
- Buried and Underground Piping (B.2.1.28)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- One-Time Inspection (B.2.1.21)
- Water Chemistry (B.2.1.2)

3.4.2.1.2 Condenser and Air Removal System

Materials

The materials of construction for the Condenser and Air Removal System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Stainless Steel

Environments

The Condenser and Air Removal System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Condenser and Air Removal System components require management:

- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Condenser and Air Removal System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Flow-Accelerated Corrosion (B.2.1.10)
- One-Time Inspection (B.2.1.21)
- TLAA
- Water Chemistry (B.2.1.2)

3.4.2.1.3 Feedwater System

Materials

The materials of construction for the Feedwater System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Stainless Steel

Environments

The Feedwater System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Treated Water
- Treated Water > 140 F

Aging Effects Requiring Management

The following aging effects associated with the Feedwater System components require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Feedwater System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Flow-Accelerated Corrosion (B.2.1.10)
- One-Time Inspection (B.2.1.21)
- TLAA
- Water Chemistry (B.2.1.2)

3.4.2.1.4 Main Steam System

Materials

The materials of construction for the Main Steam System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Stainless Steel

Environments

The Main Steam System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Condensation
- Steam
- Treated Water
- Treated Water > 140 F

Aging Effects Requiring Management

The following aging effects associated with the Main Steam System components require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Main Steam System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- One-Time Inspection (B.2.1.21)
- TLAA
- Water Chemistry (B.2.1.2)

3.4.2.1.5 Main Turbine and Auxiliaries System

Materials

The materials of construction for the Main Turbine and Auxiliaries System components are:

- Carbon Steel

Environments

The Main Turbine and Auxiliaries System components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Main Turbine and Auxiliaries System components require management:

- Loss of Material

- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Main Turbine and Auxiliaries System components:

- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- Flow-Accelerated Corrosion (B.2.1.10)
- One-Time Inspection (B.2.1.21)
- Water Chemistry (B.2.1.2)

3.4.2.2 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. For the Steam and Power Conversion System, those programs are addressed in the following subsections.

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). The evaluation of metal fatigue as a TLAA for the Condenser and Air Removal System, Feedwater System, Main Steam System, and Reactor Coolant Pressure Boundary System is discussed in Section 4.3.

3.4.2.2.2 Cracking due to Stress Corrosion Cracking (SCC)

Cracking due to stress corrosion cracking could occur for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air. The possibility of cracking also extends to components exposed to air which has recently been introduced into buildings, i.e., components near intake vents. Cracking is only known to occur in environments containing sufficient halides (primarily chlorides) and in which condensation or deliquescence is possible. Condensation or deliquescence should generally be assumed to be possible. Applicable outdoor air environments (and associated indoor air environments) include, but are not limited to, those within approximately 5 miles of a saltwater coastline, those within 1/2 mile of a highway which is treated with salt in the wintertime, those areas in which the soil contains more than trace chlorides, those plants having cooling towers where the water is treated with chlorine or chlorine compounds, and those areas subject to chloride contamination from other agricultural or industrial sources. This item is applicable for the environments described above.

GALL AMP XI.M36, "External Surfaces Monitoring," is an acceptable method to manage the aging effect. The applicant may demonstrate that this item is not applicable by describing the outdoor air environment present at the plant and demonstrating that external chloride stress corrosion cracking is not expected. The GALL Report recommends further evaluation to determine whether an adequate aging management program is used to manage this aging effect based on the environmental conditions *applicable to the plant and ASME Code Section XI requirements applicable to the components.*

LSCS will implement the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program to manage cracking due to stress corrosion cracking in stainless steel piping, piping components, and piping elements exposed to an outdoor air environment in the Condensate System. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program provides for management of aging effects through periodic inspection of external surfaces for evidence of cracking. Visual inspection activities will be performed by qualified personnel in accordance with site controlled procedures and processes. Any visible evidence of cracking will be evaluated for acceptability of continued service. Deficiencies will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program is described in Appendix B.

3.4.2.2.3 Loss of Material due to Pitting and Crevice Corrosion

Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air. The possibility of pitting and crevice corrosion also extends to components exposed to air which has recently been introduced into buildings, i.e., components near intake vents. Pitting and crevice corrosion is only known to occur in environments containing sufficient halides (primarily chlorides) and in which condensation or deliquescence is possible. Condensation or deliquescence should generally be assumed to be possible. Applicable outdoor air environments (and associated indoor air environments) include, but are not limited to, those within approximately 5 miles of a saltwater coastline, those within 1/2 mile of a highway which is treated with salt in the wintertime, those areas in which the soil contains more than trace chlorides, those plants having cooling towers where the water is treated with chlorine or chlorine compounds, and those areas subject to chloride contamination from other agricultural or industrial sources. This item is applicable for the environments described above.

GALL AMP XI.M36, "External Surfaces Monitoring," is an acceptable method to manage the aging effect. The applicant may demonstrate that this item is not applicable by describing the outdoor air environment present at the plant and demonstrating that external pitting or crevice corrosion is not expected. The GALL Report recommends further evaluation to determine whether an adequate aging management program is used to manage this aging effect based on the environmental conditions applicable to the plant and ASME Code Section XI requirements Quality Assurance for Aging Management of Nonsafety-Related Components.

LSCS will implement the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to an outdoor air environment in the Condensate System. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program provides for management of aging effects through periodic visual inspection of external surfaces for evidence of loss of material. Visual inspection activities will be performed by qualified personnel in accordance with site controlled procedures and processes. Any visible evidence of loss of material will be evaluated for acceptability of continued service. Deficiencies will be documented in accordance with 10 CFR Part 50, Appendix B corrective Action Program. The External surfaces Monitoring of Mechanical Components (B.2.1.24) program is described in Appendix B.

3.4.2.2.4 Quality Assurance for Aging Management of Nonsafety-Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.4.2.2.5 Ongoing Review of Operating Experience

Ongoing review of operating experience is addressed in Appendix A, Section A.1.6 and Appendix B, Section B.1.4.

3.4.2.2.6 Loss of Material due to Recurring Internal Corrosion

Recurring internal corrosion can result in the need to augment AMPs beyond the recommendations in the GALL Report. During the search of plant-specific OE conducted during the LRA development, recurring internal corrosion can be identified by the number of occurrences of aging effects and the extent of degradation at each localized corrosion site. This further evaluation item is applicable if the search of plant-specific OE reveals repetitive occurrences (e.g., one per refueling outage cycle that has occurred over: (a) three or more sequential or nonsequential cycles for a 10-year OE search, or (b) two or more sequential or nonsequential cycles for a 5-year OE search) of aging effects with the same aging mechanism in which the aging effect resulted in the component either not meeting plant-specific acceptance criteria or experiencing a reduction in wall thickness greater than 50 percent (regardless of the minimum wall thickness.)

The GALL Report recommends that a plant-specific AMP, or a new or existing AMP, be evaluated for inclusion of augmented requirements to ensure the adequate management of any recurring aging effect(s). Potential augmented requirements include: alternative examination methods (e.g., volumetric versus external visual), augmented inspections (e.g., a greater number of locations, additional locations based on risk insights based on susceptibility to aging effect and consequences of failure, a greater frequency of inspections), and additional trending parameters and decision points where increased inspections would be implemented. Acceptance criteria are described in Appendix A.1, "Aging Management Review – Generic (Branch Technical Position RSLB-1)."

The applicant states: (a) why the program's examination methods will be sufficient to detect the recurring aging effect before affecting the ability of a component to perform its intended function, (b) the basis for the adequacy of augmented or lack of augmented inspections, (c) what parameters will be trended as well as the decision points where increased inspections would be implemented (e.g., the extent of degradation at individual corrosion sites, the rate of degradation change), (d) how inspections of components that are not easily accessed (i.e., buried, underground) will be conducted, and (e) how leaks in any involved buried or underground components will be identified.

Each plant-specific operating experience example should be evaluated to determine if the chosen AMP should be augmented even if the thresholds for significance of aging effect or frequency of occurrence of aging effect have not been exceeded. For example, during a 10-year search of plant specific operating experience, two instances of 360 *degree 30 percent wall loss occurred at copper alloy to steel joints. Neither the significance of the aging effect nor the frequency of occurrence of aging effect threshold has been exceeded. Nevertheless, the operating experience should be evaluated to determine if the AMP that is proposed to manage the aging effect is sufficient (e.g., method of inspection, frequency of inspection, number of inspections) to provide reasonable assurance that the CLB intended functions of the component will be met throughout the period of extended operation. Likewise, the GALL Report AMR items associated with the new FE items only cite raw water and waste water environments because OE indicates that these are the predominant environments associated with recurring internal corrosion; however, if the search of plant-specific OE reveals recurring internal corrosion in other water environments (e.g., treated water), the aging effect should be addressed in a similar manner.*

LR-ISG-2012-02 has been issued which addresses instances of recurring internal corrosion identified during review of plant-specific operating experience. The operating experience for LSCS has been reviewed and instances of internal corrosion in the Steam and Power Conversion System have not been identified with a frequency that is consistent with the thresholds discussed in LR-ISG-2012-02.

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 Analyses

- Section 4.3.2, ASME Section III, Class 2 and 3 and ANSI B31.1 Allowable Stress Analyses
- Section 4.3.5, High-Energy Line Break (HELB) Analysis Based on Fatigue
- Section 4.3.6, Main Steam Relief Valve Discharge Piping Fatigue Analyses

3.4.3 CONCLUSION

The Steam and Power Conversion System piping, fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Steam and Power Conversion System components are identified in the summaries in Section 3.4.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Steam and Power Conversion System components will be adequately managed so that there is reasonable assurance that the intended functions are maintained consistent with the current licensing basis during the period of extended operation.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

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 due to fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the SRP, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.4.2.2.1.
3.4.1-2	Stainless steel Piping, piping components, and piping elements; tanks exposed to Air – outdoor	Cracking due to stress corrosion cracking	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage cracking of the stainless steel piping, piping components, and piping elements exposed to air - outdoor in the Condensate System. See Subsection 3.4.2.2.2.
3.4.1-3	Stainless steel Piping, piping components, and piping elements; tanks exposed to Air – outdoor	Loss of material due to pitting and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of the stainless steel piping, piping components, and piping elements exposed to air - outdoor in the Condensate System. See subsection 3.4.2.2.3.
3.4.1-4	PWR Only				

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.4.1-5	Steel Piping, piping components, and piping elements exposed to Steam, Treated water	Wall thinning due to flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No	Consistent with NUREG-1801. The Flow-Accelerated Corrosion (B.2.1.10) program will be used to manage wall thinning of the carbon steel piping, piping components, and piping elements, and turbine casings exposed to steam and treated water in the Condenser and Air Removal System, Feedwater System, Main Steam System, and Main Turbine and Auxiliaries System.
3.4.1-6	Steel, Stainless Steel Bolting exposed to Soil	Loss of preload	Chapter XI.M18, "Bolting Integrity "	No	Not Applicable. There are no steel or stainless steel bolting exposed to soil in the Steam and Power Conversion System.
3.4.1-7	High-strength steel Closure bolting exposed to Air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Chapter XI.M18, "Bolting Integrity"	No	Not Applicable. There are no high strength steel closure bolting exposed to air with steam or water leakage in the Steam and Power Conversion System.
3.4.1-8	Steel; stainless steel Bolting, Closure bolting exposed to Air – outdoor (External), Air – indoor, uncontrolled (External)	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage loss of material of the carbon and low alloy steel bolting exposed to air - indoor uncontrolled and air - outdoor in the Condensate System, Condenser and Air Removal System, Feedwater System, and Main Steam System.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-9	Steel Closure bolting exposed to Air with steam or water leakage	Loss of material due to general corrosion	Chapter XI.M18, "Bolting Integrity"	No	Not Applicable. There is no steel closure bolting exposed to air with steam or water leakage in the Steam and Power Conversion System.
3.4.1-10	Copper alloy, Nickel alloy, Steel; stainless steel, Steel; stainless steel Bolting, Closure bolting exposed to Any environment, Air – outdoor (External), Air – indoor, uncontrolled (External)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Chapter XI.M18, "Bolting Integrity"	No	Consistent with NUREG-1801. The Bolting Integrity (B.2.1.11) program will be used to manage loss of preload of the carbon and low alloy steel bolting exposed to air - indoor uncontrolled and air - outdoor in the Condensate System, Condenser and Air Removal System, Feedwater System, and Main Steam System.
3.4.1-11	Stainless steel Piping, piping components, and piping elements, Tanks, Heat exchanger components exposed to Steam, Treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage cracking of the stainless steel piping, piping components, and piping elements exposed to steam and treated water > 140 F in the Feedwater System, Main Steam System, and Reactor Coolant Pressure Boundary System. An exception applies to the NUREG-1801 recommendations for the Water Chemistry (B.2.1.2) program implementation.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-12	Steel; stainless steel Tanks exposed to Treated water	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of the carbon steel tanks exposed to treated water in the Condensate System. An exception applies to the NUREG-1801 recommendations for the Water Chemistry (B.2.1.2) program implementation.
3.4.1-13	PWR Only				
3.4.1-14	Steel Piping, piping components, and piping elements, PWR heat exchanger components exposed to Steam, Treated water	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of the carbon steel piping, piping components, and piping elements and turbine casings exposed to steam and treated water in the Condensate System, Condenser and Air Removal System, Feedwater System, Main Steam System, Main Turbine and Auxiliaries System, Reactor Coolant Pressure Boundary System, and Reactor Core Isolation Cooling System. An exception applies to the NUREG-1801 recommendations for the Water Chemistry (B.2.1.2) program implementation.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-15	Steel Heat exchanger components exposed to Treated water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of the carbon steel heat exchanger components and piping, piping components, and piping elements exposed to treated water in the Condenser and Air Removal System and Demineralized Water Makeup System. An exception applies to the NUREG-1801 recommendations for the Water Chemistry (B.2.1.2) program implementation.
3.4.1-16	Copper alloy, Stainless steel, Nickel alloy, Aluminum Piping, piping components, and piping elements, Heat exchanger components and tubes, PWR heat exchanger components exposed to Treated water, Steam	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Chapter XI.M32, "One-Time Inspection"	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage loss of material of the aluminum alloy, copper alloy, and stainless steel heat exchanger components and piping, piping components, and piping elements exposed to steam and treated water in the Condensate System, Condenser and Air Removal System, Demineralized Water Makeup System, Feedwater System, Low Pressure Core Spray System, Main Steam System, Reactor Coolant Pressure Boundary System , and Reactor Core Isolation Cooling System. An exception applies to the NUREG-1801 recommendations for the Water Chemistry (B.2.1.2) program implementation.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-17	PWR Only				
3.4.1-18	Copper alloy, Stainless steel Heat exchanger tubes exposed to Treated water	Reduction of heat transfer due to fouling	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection”	No	Consistent with NUREG-1801 with exceptions. The One-Time Inspection (B.2.1.21) program and Water Chemistry (B.2.1.2) program will be used to manage reduction of heat transfer of the copper alloy heat exchanger tubes exposed to treated water in the Reactor Core Isolation Cooling System. An exception applies to the NUREG-1801 recommendations for the Water Chemistry (B.2.1.2) program implementation.
3.4.1-19	Stainless steel, Steel Heat exchanger components exposed to Raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologically-influenced corrosion; fouling that leads to corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no stainless steel, steel heat exchanger components exposed to raw water in the Steam and Power Conversion System.
3.4.1-20	Copper alloy, Stainless steel Piping, piping components, and piping elements exposed to Raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no copper alloy, stainless steel piping, piping components, and piping elements exposed to raw water in the Steam and Power Conversion System.
3.4.1-21	PWR Only				

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.4.1-22	Stainless steel, Copper alloy, Steel Heat exchanger tubes, Heat exchanger components exposed to Raw water	Reduction of heat transfer due to fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not Applicable. There are no stainless steel, copper alloy, steel heat exchanger tubes, and heat exchanger components exposed to raw water in the Steam and Power Conversion System.
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	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no stainless steel piping, piping components, and piping elements exposed to closed-cycle cooling water >60ºC (>140ºF) in the Steam and Power Conversion System.
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	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no steel heat exchanger components exposed to closed-cycle cooling water in the Steam and Power Conversion System.
3.4.1-25	Steel Heat exchanger components exposed to Closed-cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no steel heat exchanger components exposed to closed-cycle cooling water in the Steam and Power Conversion System.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.4.1-26	Stainless steel Heat exchanger components, Piping, piping components, and piping elements exposed to Closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no stainless steel heat exchanger components, piping, piping components, and piping elements exposed to closed-cycle cooling water in the Steam and Power Conversion System.
3.4.1-27	Copper alloy Piping, piping components, and piping elements exposed to Closed-cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no copper alloy piping, piping components, and piping elements exposed to closed-cycle cooling water in the Steam and Power Conversion System.
3.4.1-28	Steel, Stainless steel, Copper alloy Heat exchanger components and tubes, Heat exchanger tubes exposed to Closed-cycle cooling water	Reduction of heat transfer due to fouling	Chapter XI.M21A, "Closed Treated Water Systems"	No	Not Applicable. There are no steel, stainless steel, copper alloy heat exchanger components and tubes, heat exchanger tubes exposed to closed-cycle cooling water in the Steam and Power Conversion System.
3.4.1-29	Steel Tanks exposed to Air – outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Not Applicable. There are no steel tanks exposed to air-outdoor (external) in the Steam and Power Conversion System.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-30	Steel, Stainless Steel, Aluminum Tanks (within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to Soil or Concrete, or the following external environments air-outdoor, air-indoor uncontrolled, moist air, condensation	Loss of material due to general, (steel only) pitting, and crevice corrosion; cracking due to stress corrosion cracking (stainless steel and aluminum only)	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Not Applicable. There are no steel or stainless steel tanks (within the scope of chapter XI.M29, “Aboveground Metallic Tanks”) exposed to soil or concrete, or the following external environments of air-outdoor, air-indoor uncontrolled, moist air, condensation in the Steam and Power Conversion System. Aluminum tanks (within the scope of chapter XI.M29, “Aboveground Metallic Tanks) are evaluated in 3.4.1-31.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-31	Stainless steel, Aluminum Tanks (within the scope of Chapter XI.M29, "Aboveground Metallic Tanks") exposed to Soil or Concrete, or the following external environments air-outdoor, air-indoor uncontrolled, moist air, condensation	Loss of material due to pitting, and crevice corrosion; cracking due to stress corrosion cracking	Chapter XI.M29, "Aboveground Metallic Tanks"	Yes-Plant-Specific	Consistent with NUREG-1801. The Aboveground Metallic Tanks (B.2.1.18) program will be used to manage loss of material of the aluminum alloy tanks (cycled condensate storage tank) exposed to air-outdoor, condensation, concrete, and soil in the Condensate System. The aging effect of cracking due to stress corrosion cracking does not apply. Cracking in aluminum alloy of these environments occurs when the aluminum alloy chemical composition includes greater than 12% zinc or greater than 6% magnesium (ref. EPRI Report 1010639, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4 dated January 2006). The cycled condensate storage tank is constructed of ASTM B209 alloy 5454 plates and ASTM B308 alloy 6061-T6 structural members. Both these alloys contain less than 12% zinc and less than 6% magnesium. See 3.4.2.2.2 for further evaluation.
3.4.1-32	Gray cast iron Piping, piping components, and piping elements exposed to Soil	Loss of material due to selective leaching	Chapter XI.M33, "Selective Leaching"	No	Not Applicable. There are no gray cast iron piping, piping components, and piping elements exposed to soil in the Steam and Power Conversion System.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.4.1-33	Gray cast iron, Copper alloy (>15% Zn or >8% Al) Piping, piping components, and piping elements exposed to Treated water, Raw water, Closed-cycle cooling water	Loss of material due to selective leaching	Chapter XI.M33, “Selective Leaching”	No	Not Applicable. There are no gray cast iron or copper alloy piping, piping components or piping elements exposed to treated water or raw water in the Steam and Power Conversion System.
3.4.1-34	Steel External surfaces exposed to Air – indoor, uncontrolled (External), Air – outdoor (External), Condensation (External)	Loss of material due to general corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of the carbon steel heat exchanger components, piping, piping components, and piping elements, and tanks exposed to air - indoor uncontrolled and air - outdoor in the Condensate System, Condenser and Air Removal System, Feedwater System, Main Steam System, and Main Turbine and Auxiliaries System.
3.4.1-35	Aluminum Piping, piping components, and piping elements exposed to Air - outdoor	Loss of material due to pitting and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of the aluminum alloy piping, piping components, and piping elements exposed to air - outdoor in the Condensate System.
3.4.1-36	PWR Only				

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-37	Steel Piping, piping components, and piping elements exposed to Condensation (Internal)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) program will be used to manage loss of material of the carbon steel piping, piping components, and piping elements and tanks exposed to condensation in the Condensate System and Main Steam System.
3.4.1-38	PWR Only				
3.4.1-39	Stainless steel Piping, piping components, and piping elements exposed to Condensation (Internal)	Loss of material due to pitting and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Not Applicable. There are no stainless steel piping, piping components, and piping elements exposed to condensation (internal) in the Steam and Power Conversion System.
3.4.1-40	Steel Piping, piping components, and piping elements exposed to Lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, “One-Time Inspection”	No	Not Applicable. There are no steel piping, piping components, and piping elements exposed to lubricating oil in Steam and Power Conversion System.
3.4.1-41	PWR Only				
3.4.1-42	PWR Only				

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-43	Copper alloy Piping, piping components, and piping elements exposed to Lubricating oil	Loss of material due to pitting and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Not Applicable. There are no copper alloy piping, piping components, and piping elements exposed to lubricating oil in the Steam and Power Conversion System.
3.4.1-44	Stainless steel Piping, piping components, and piping elements, Heat exchanger components exposed to Lubricating oil	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection"	No	Not Applicable. There are no stainless steel piping, piping components, and piping elements or heat exchanger components exposed to lubricating oil in the Steam and Power Conversion System.
3.4.1-45	PWR Only				
3.4.1-46	PWR Only				
3.4.1-47	Steel (with coating or wrapping), stainless steel, nickel-alloy piping, piping components, and piping elements; tanks exposed to Soil or Concrete	Loss of material due to general (steel only), pitting, crevice, and microbiologically-influenced corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Consistent with NUREG-1801. The Buried and Underground Piping (B.2.1.28) program will be used to manage loss of material of the carbon steel piping, piping components, and piping elements exposed to soil in the Condensate System.
3.4.1-48	Stainless steel, nickel alloy bolting exposed to soil	Loss of material due to pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There is no stainless steel or nickel alloy bolting exposed to soil in the Steam and Power Conversion System.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-49	Stainless steel, nickel alloy piping, piping components, and piping elements exposed to soil or concrete	Loss of material due to pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no stainless steel or nickel alloy piping, piping components, and piping elements exposed to soil or concrete in the Steam and Power Conversion System.
3.4.1-50	Steel Bolting exposed to Soil	Loss of material due to general, pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There is no steel bolting exposed to soil in the Steam and Power Conversion System.
3.4.1-50x	Underground stainless steel, nickel alloy, steel piping, piping components, and piping elements	Loss of material due to general (steel only), pitting and crevice corrosion	Chapter XI.M41, "Buried and Underground Piping and Tanks"	No	Not Applicable. There are no underground stainless steel, nickel alloy, or steel piping, piping components, and piping elements in the Steam and Power Conversion System.
3.4.1-51	Steel Piping, piping components, and piping elements exposed to Concrete	None	None, provided 1) attributes of the concrete are consistent with ACI 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG-1557, and 2) plant OE indicates no degradation of the concrete	No, if conditions are met.	Not applicable. There are no steel piping, piping components, and piping elements exposed to concrete in the Steam and Power Conversion System.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-52	Aluminum Piping, piping components, and piping elements exposed to Gas, Air – indoor, uncontrolled (Internal/External)	None	None	NA - No AEM or AMP	Not Applicable. There are no aluminum piping, piping components, and piping elements exposed to gas, air-indoor, uncontrolled (internal/external) in the Steam and Power Conversion System.
3.4.1-53	PWR Only				
3.4.1-54	Copper alloy Piping, piping components, and piping elements exposed to Gas, Air – indoor, uncontrolled (External)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-55	Glass Piping elements exposed to Lubricating oil, Air – outdoor, Condensation (Internal/External), Raw water, Treated water, Air with borated water leakage, Gas, Closed-cycle cooling water, Air – indoor, uncontrolled (External)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-56	Nickel alloy Piping, piping components, and piping elements exposed to Air – indoor, uncontrolled (External)	None	None	NA - No AEM or AMP	Not Applicable. There are no nickel alloy piping, piping components, and piping elements exposed to air-indoor, uncontrolled (external) in the Steam and Power Conversion System.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-57	Nickel alloy, PVC Piping, piping components, and piping elements exposed to Air with borated water leakage, Air – indoor, uncontrolled, Condensation (Internal)	None	None	NA - No AEM or AMP	Not Applicable. There are no nickel alloy or PVC piping, piping components, and piping elements exposed to air-indoor, uncontrolled or condensation (internal) in the Steam and Power Conversion System.
3.4.1-58	Stainless steel Piping, piping components, and piping elements exposed to Air – indoor, uncontrolled (External), Concrete, Gas, Air – indoor, uncontrolled (Internal)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-59	Steel Piping, piping components, and piping elements exposed to Air – indoor controlled (External), Gas	None	None	NA - No AEM or AMP	Not Applicable. There are no steel piping, piping components, and piping elements exposed to air-indoor controlled (external) or gas in the Steam and Power Conversion System.
3.4.1-60	Any material, piping, piping components, and piping elements exposed to treated water	Wall thinning due to erosion	Chapter XI.M17, "Flow-Accelerated Corrosion"	No	Consistent with NUREG-1801. The Flow-Accelerated Corrosion (B.2.1.10) program will be used to manage wall thinning of the carbon steel heat exchanger components exposed to treated water in the Condensate and Air Removal System.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.4.1-61	Metallic piping, piping components, and tanks exposed to raw water or waste water	Loss of material due to recurring internal corrosion	A plant-specific aging management program is to be evaluated to address recurring internal corrosion	Yes, plant-specific	See subsection 3.4.2.2.6.
3.4.1-62	Steel, stainless steel or aluminum tanks (within the scope of Chapter XI.M29, “Aboveground Metallic Tanks”) exposed to treated water	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Consistent with NUREG-1801. The Aboveground Metallic Tanks (B.2.1.18) program will be used to manage loss of material of the aluminum alloy tanks exposed to treated water in the Condensate System.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.4.1-63	Insulated steel, stainless steel, copper alloy, aluminum, or copper alloy (> 15% Zn) piping, piping components, and tanks exposed to condensation, air-outdoor	Loss of material due to general (steel, and copper alloy), pitting, or crevice corrosion, and cracking due to stress corrosion cracking (aluminum, stainless steel and copper alloy (>15% Zn) only)	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components" or Chapter XI.M29, “Aboveground Metallic Tanks” (for tanks only)	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage loss of material of the aluminum alloy, carbon steel, and stainless steel piping, piping components and piping elements and cracking of the stainless steel piping, piping components, and piping elements exposed to air-outdoor in the Condensate System. The aging effect of cracking due to stress corrosion cracking in aluminum does not apply. Cracking in aluminum alloy of these environments occurs when the aluminum alloy chemical composition includes greater than 12% zinc or greater than 6% magnesium (ref. EPRI Report 1010639, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4 dated January 2006). The cycled condensate storage tank is constructed of ASTM B209 alloy 5454 plates and ASTM B308 alloy 6061-T6 structural members. Both these alloys contain less than 12% zinc and less than 6% magnesium.
3.4.1-64	Jacketed calcium silicate or fiberglass insulation in an air-indoor uncontrolled or air-outdoor environment	Reduced thermal insulation resistance due to moisture intrusion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage reduced thermal insulation resistance of the jacketed calcium silicate or fiberglass insulation exposed to air-indoor uncontrolled and air-outdoor in the Structural Commodity Group.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-65	Jacketed foamglas ® (glass dust) insulation in an air-indoor uncontrolled or air-outdoor environment	Reduced thermal insulation resistance due to moisture intrusion	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.24) program will be used to manage reduced thermal insulation resistance of the jacketed foamed plastic insulation and stainless steel insulation and insulation jacketing exposed to air-indoor uncontrolled and air-outdoor in the Structural Commodity Group.

Table 3.4.2-1
Condensate System
Summary of Aging Management Evaluation

Table 3.4.2-1 Condensate System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VIII.H.SP-84	3.4.1-8	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VIII.H.SP-83	3.4.1-10	A
			Air - Outdoor (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VIII.H.SP-82	3.4.1-8	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VIII.H.SP-151	3.4.1-10	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Condensation (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.E.S-402	3.4.1-63	A, 4
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	B
	Pressure Boundary	Aluminum Alloy	Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.SP-147	3.4.1-35	A
						VIII.E.S-402	3.4.1-63	A
				None	None	VIII.E.S-402	3.4.1-63	I, 3

Table 3.4.2-1 Condensate System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Aluminum Alloy	Condensation (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.F1.AP-142	3.3.1-92	A, 1
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-90	3.4.1-16	A, 2
					Water Chemistry (B.2.1.2)	VIII.E.SP-90	3.4.1-16	B, 2
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-90	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-90	3.4.1-16	B
		Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-41	3.4.1-34	A
						VIII.E.S-402	3.4.1-63	A
			Soil (External)	Loss of Material	Buried and Underground Piping (B.2.1.28)	VIII.E.SP-145	3.4.1-47	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	B
Tanks (Cycled Condensate Gland Seal Head Tank)	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A

Table 3.4.2-1 Condensate System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (Cycled Condensate Gland Seal Head Tank)	Leakage Boundary	Carbon Steel	Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VIII.G.SP-60	3.4.1-37	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-75	3.4.1-12	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-75	3.4.1-12	B
Tanks (Cycled Condensate Storage Tank)	Pressure Boundary	Aluminum Alloy	Air - Outdoor (External)	Loss of Material	Aboveground Metallic Tanks (B.2.1.18)	VIII.E.SP-139	3.4.1-31	A
				None	None	VIII.E.SP-139	3.4.1-31	I, 3
			Concrete (External)	Loss of Material	Aboveground Metallic Tanks (B.2.1.18)	VIII.E.SP-139	3.4.1-31	A
				None	None	VIII.E.SP-139	3.4.1-31	I, 3
			Condensation (Internal)	Loss of Material	Aboveground Metallic Tanks (B.2.1.18)	VIII.E.SP-139	3.4.1-31	A
				None	None	VIII.E.SP-139	3.4.1-31	I, 3
			Soil (External)	Loss of Material	Aboveground Metallic Tanks (B.2.1.18)	VIII.E.SP-139	3.4.1-31	A
				None	None	VIII.E.SP-139	3.4.1-31	I, 3
			Treated Water (Internal)	Loss of Material	Aboveground Metallic Tanks (B.2.1.18)	VIII.E.S-405	3.4.1-62	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	B
		Copper Alloy with less than 15% Zinc	Air - Indoor Uncontrolled (External)	None	None	VIII.I.SP-6	3.4.1-54	A

Table 3.4.2-1 Condensate System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Copper Alloy with less than 15% Zinc	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.A.SP-101	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-41	3.4.1-34	A
						VIII.E.S-402	3.4.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	B
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Air - Outdoor (External)	Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.E.SP-118	3.4.1-2	A
						VIII.E.S-402	3.4.1-63	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.E.SP-127	3.4.1-3	A
						VIII.E.S-402	3.4.1-63	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	B

Table 3.4.2-1 Condensate System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Aluminum piping exposed to a condensation (external) environment is located in the airspace of the Cycled Condensate Storage Tank. This piping will be inspected using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) aging management program. The external surfaces of this piping will be made accessible for inspection during internal tank inspections performed under the Aboveground Metallic Tanks (B.2.1.18) aging management program.

2. Aluminum piping exposed to a treated water (external) environment is submerged piping located in the Cycled Condensate Storage Tank.

3. The aging effect of cracking due to stress corrosion cracking does not apply. Cracking in aluminum alloy in this environment occurs when the aluminum alloy chemical composition includes greater than 12% zinc or greater than 6% magnesium (ref. EPRI Report 1010639, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4 dated January 2006). The cycled condensate storage tank is constructed of ASTM B209 alloy 5454 plates and ASTM B308 alloy 6061-T6 structural members and piping. Both these alloys contain less than 12% zinc and less than 6% magnesium.

4. These components are in an air-indoor, uncontrolled environment, and are insulated. Because of the potential for air in-leakage through minor gaps in insulation, condensation can occur underneath the insulation on components when the operating temperature of the component is below the dew point of the air on the external surfaces of the insulation.

Table 3.4.2-2

Condenser and Air Removal System

Summary of Aging Management Evaluation

Table 3.4.2-2 Condenser and Air Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VIII.H.SP-84	3.4.1-8	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VIII.H.SP-83	3.4.1-10	A
Heat Exchanger - (Main Condenser) Shell Side Components	Containment, Holdup and Plateout	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-77	3.4.1-15	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-77	3.4.1-15	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-408	3.4.1-60	C
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-87	3.4.1-16	A

Table 3.4.2-2 Condenser and Air Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	B
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A

Table 3.4.2-2 Condenser and Air Removal System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.4.2-3

Feedwater System

Summary of Aging Management Evaluation

Table 3.4.2-3 Feedwater System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VIII.H.SP-84	3.4.1-8	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VIII.H.SP-83	3.4.1-10	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VIII.D2.S-11	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.D2.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-87	3.4.1-16	B
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VIII.E.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-88	3.4.1-11	B
				Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.D2.SP-87	3.4.1-16	A

Table 3.4.2-3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Treated Water > 140 F (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VIII.D2.SP-87	3.4.1-16	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VIII.D2.S-11	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.D2.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-87	3.4.1-16	B
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	B

Table 3.4.2-3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon Steel	Treated Water (Internal)	Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A

Table 3.4.2-3 Feedwater System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.4.2-4
Main Steam System
Summary of Aging Management Evaluation

Table 3.4.2-4 Main Steam System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VIII.H.SP-84	3.4.1-8	A
				Loss of Preload	Bolting Integrity (B.2.1.11)	VIII.H.SP-83	3.4.1-10	A
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Condensation (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VIII.B1.SP-60	3.4.1-37	A
			Steam (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.B2.S-15	3.4.1-5	A

Table 3.4.2-4 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Treated Water (External)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	B
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Steam (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VIII.B2.SP-98	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-98	3.4.1-11	B
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-155	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-155	3.4.1-16	B
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	B
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	B
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.C.SP-87	3.4.1-16	A

Table 3.4.2-4 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Treated Water > 140 F (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	B
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	B
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A
		Stainless Steel	Air - Indoor Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Treated Water > 140 F (Internal)	Cracking	One-Time Inspection (B.2.1.21)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	B
				Loss of Material	One-Time Inspection (B.2.1.21)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	B

Table 3.4.2-4 Main Steam System (Continued)

Notes	**Definition of Note**
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.4.2-5

Main Turbine and Auxiliaries System

Summary of Aging Management Evaluation

Table 3.4.2-5 Main Turbine and Auxiliaries System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Turbine Casings (Low Pressure Turbine Exhaust Hoods)	Containment, Holdup and Plateout	Carbon Steel	Air - Indoor Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.21)	VIII.B2.SP-73	3.4.1-14	C
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	D
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	C

Table 3.4.2-5 Main Turbine and Auxiliaries System (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

3.5 AGING MANAGEMENT OF 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 systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- Auxiliary Building (2.4.1)
- Component Supports Commodity Group (2.4.2)
- Cooling Lake (2.4.3)
- Diesel Generator Building (2.4.4)
- Lake Screen House (2.4.5)
- Offgas Building (2.4.6)
- Primary Containment (2.4.7)
- Radwaste Building (2.4.8)
- Reactor Building (2.4.9)
- Structural Commodity Group (2.4.10)
- Switchyard Structures (2.4.11)
- Tank Foundations and Dikes (2.4.12)
- Turbine Building (2.4.13)
- Yard Structures (2.4.14)

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 Auxiliary Building - Summary of Aging Management Evaluation

Table 3.5.2-2 Component Supports Commodity Group - Summary of Aging Management Evaluation

Table 3.5.2-3 Cooling Lake - Summary of Aging Management Evaluation

Table 3.5.2-4 Diesel Generator Building - Summary of Aging Management Evaluation

Table 3.5.2-5 Lake Screen House - Summary of Aging Management Evaluation

Table 3.5.2-6 Offgas Building - Summary of Aging Management Evaluation

Table 3.5.2-7 Primary Containment - Summary of Aging Management Evaluation

Table 3.5.2-8 Radwaste Building - Summary of Aging Management Evaluation

Table 3.5.2-9 Reactor Building - Summary of Aging Management Evaluation

Table 3.5.2-10 Structural Commodity Group - Summary of Aging Management Evaluation

Table 3.5.2-11 Switchyard Structures - Summary of Aging Management Evaluation

Table 3.5.2-12 Tank Foundations and Dikes - Summary of Aging Management Evaluation

Table 3.5.2-13 Turbine Building - Summary of Aging Management Evaluation

Table 3.5.2-14 Yard Structures - Summary of Aging Management Evaluation

3.5.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Management Programs

3.5.2.1.1 Auxiliary Building

Materials

The materials of construction for the Auxiliary Building components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Galvanized Steel
- Reinforced concrete
- Stainless Steel

Environments

The Auxiliary Building components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Condensation
- Groundwater/Soil
- Waste Water

- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Building components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Auxiliary Building components:

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Masonry Walls (B.2.1.33)
- Structures Monitoring (B.2.1.34)

3.5.2.1.2 Component Supports Commodity Group

Materials

The materials of construction for the Component Supports Commodity Group components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete
- Galvanized Steel
- Galvanized Steel Bolting
- Grout
- Lubrite
- Reinforced concrete
- Stainless Steel

- Stainless Steel Bolting

Environments

The Component Supports Commodity Group components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Component Supports Commodity Group components require management:

- Loss of Material
- Loss of Mechanical Function
- Loss of Preload
- Reduction in Concrete Anchor Capacity

Aging Management Programs

The following aging management programs manage the aging effects for the Component Supports Commodity Group components:

- ASME Section XI, Subsection IWF (B.2.1.31)
- Structures Monitoring (B.2.1.34)
- Water Chemistry (B.2.1.2)

3.5.2.1.3 Cooling Lake

Materials

The materials of construction for the Cooling Lake components are:

- Galvanized Steel
- Reinforced concrete
- Soil, Rip-Rap, Sand, Gravel

Environments

The Cooling Lake components are exposed to the following environments:

- Air - Outdoor
- Concrete
- Groundwater/Soil
- Water - Flowing

- Water - Standing

Aging Effects Requiring Management

The following aging effects associated with the Cooling Lake components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Material or Loss of Form

Aging Management Programs

The following aging management programs manage the aging effects for the Cooling Lake components:

- RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)
- Structures Monitoring (B.2.1.34)

3.5.2.1.4 Diesel Generator Building

Materials

The materials of construction for the Diesel Generator Building components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Galvanized Steel
- Reinforced concrete
- Stainless Steel
- Stainless Steel Bolting

Environments

The Diesel Generator Building components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor

- Concrete
- Condensation
- Groundwater/Soil
- Waste Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Diesel Generator Building components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Diesel Generator Building components:

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Masonry Walls (B.2.1.33)
- Structures Monitoring (B.2.1.34)

3.5.2.1.5 Lake Screen House

Materials

The materials of construction for the Lake Screen House components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete
- Concrete Block
- Galvanized Steel
- Galvanized Steel Bolting

- Reinforced concrete
- Stainless Steel Bolting

Environments

The Lake Screen House components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Groundwater/Soil
- Raw Water
- Water - Flowing
- Water - Standing

Aging Effects Requiring Management

The following aging effects associated with the Lake Screen House components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling)
- Loss of Material (Spalling, Scaling) and Cracking
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Lake Screen House components:

- Masonry Walls (B.2.1.33)
- RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)
- Structures Monitoring (B.2.1.34)

3.5.2.1.6 Offgas Building

Materials

The materials of construction for the Offgas Building components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Galvanized Steel
- Reinforced concrete

Environments

The Offgas Building components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Groundwater/Soil
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Offgas Building components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Offgas Building components:

- Masonry Walls (B.2.1.33)
- Structures Monitoring (B.2.1.34)

3.5.2.1.7 Primary Containment

Materials

The materials of construction for the Primary Containment components are:

- Aluminum
- Carbon Steel
- Carbon Steel; dissimilar metal welds
- Carbon and Low Alloy Steel Bolting
- Coatings
- Concrete
- Elastomer
- Fiberglass
- Glass
- Lead
- Reinforced concrete
- Stainless Steel
- Stainless Steel Bolting

Environments

The Primary Containment components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Concrete
- Condensation
- Encased in Steel
- Groundwater/Soil
- Treated Water
- Waste Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Primary Containment components require management:

- Change in Material Properties
- Cracking
- Cracking and Distortion

- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Cumulative Fatigue Damage
- Fretting or Lockup
- Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)
- Increase in Porosity and Permeability, Loss of Strength
- Loss of Coating Integrity
- Loss of Leaktightness
- Loss of Material
- Loss of Mechanical Function
- Loss of Preload
- Loss of Prestress
- Loss of Sealing

Aging Management Programs

The following aging management programs manage the aging effects for the Primary Containment components:

- 10 CFR Part 50, Appendix J (B.2.1.32)
- ASME Section XI, Subsection IWE (B.2.1.29)
- ASME Section XI, Subsection IWF (B.2.1.31)
- ASME Section XI, Subsection IWL (B.2.1.30)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Protective Coating Monitoring and Maintenance Program (B.2.1.36)
- Structures Monitoring (B.2.1.34)
- TLAA

3.5.2.1.8 Radwaste Building

Materials

The materials of construction for the Radwaste Building components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Galvanized Steel
- Galvanized Steel Bolting

- Reinforced concrete
- Stainless Steel

Environments

The Radwaste Building components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Condensation
- Groundwater/Soil
- Waste Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Radwaste Building components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Radwaste Building components:

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Masonry Walls (B.2.1.33)
- Structures Monitoring (B.2.1.34)

3.5.2.1.9 Reactor Building

Materials

The materials of construction for the Reactor Building components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Elastomer
- Galvanized Steel
- Lead
- Reinforced concrete
- Stainless Steel

Environments

The Reactor Building components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Condensation
- Groundwater/Soil
- Treated Water
- Waste Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Reactor Building components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Preload

- Loss of Sealing

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Building components:

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Masonry Walls (B.2.1.33)
- Structures Monitoring (B.2.1.34)
- Water Chemistry (B.2.1.2)

3.5.2.1.10 Structural Commodity Group

Materials

The materials of construction for the Structural Commodity Group components are:

- Aluminum
- Calcium Silicate
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Cellular Glass
- Ceramic Fiber (includes Microtherm MPS)
- Elastomer
- Fiberglass
- Foamed Plastic (includes Armaflex)
- Galvanized Steel
- Glass
- Grout
- Lead
- Plastic Mastic Jacketing
- Polymers
- Stainless Steel
- Stainless Steel Bolting

Environments

The Structural Commodity Group components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Groundwater/Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Structural Commodity Group components require management:

- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)
- Loss of Material
- Loss of Material (Spalling, Scaling) and Cracking
- Loss of Preload
- Loss of Sealing
- Reduced Thermal Insulation Resistance

Aging Management Programs

The following aging management programs manage the aging effects for the Structural Commodity Group components:

- External Surfaces Monitoring of Mechanical Components (B.2.1.24)
- One-Time Inspection (B.2.1.21)
- Structures Monitoring (B.2.1.34)
- Water Chemistry (B.2.1.2)

3.5.2.1.11 Switchyard Structures

Materials

The materials of construction for the Switchyard Structures components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Ductile Cast Iron

- Galvanized Steel
- Galvanized Steel Bolting
- Reinforced concrete

Environments

The Switchyard Structures components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Groundwater/Soil
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Switchyard Structures components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Switchyard Structures components:

- Masonry Walls (B.2.1.33)
- Structures Monitoring (B.2.1.34)

3.5.2.1.12 Tank Foundations and Dikes

Materials

The materials of construction for the Tank Foundations and Dikes components are:

- Carbon and Low Alloy Steel Bolting
- Elastomer
- Galvanized Steel

- Reinforced concrete

Environments

The Tank Foundations and Dikes components are exposed to the following environments:

- Air - Outdoor
- Concrete
- Groundwater/Soil
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Tank Foundations and Dikes components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Preload
- Loss of Sealing

Aging Management Programs

The following aging management programs manage the aging effects for the Tank Foundations and Dikes components:

- Aboveground Metallic Tanks (B.2.1.18)
- Structures Monitoring (B.2.1.34)

3.5.2.1.13 Turbine Building

Materials

The materials of construction for the Turbine Building components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Galvanized Steel

- Reinforced concrete
- Stainless Steel

Environments

The Turbine Building components are exposed to the following environments:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Concrete
- Condensation
- Groundwater/Soil
- Waste Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Turbine Building components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Turbine Building components:

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)
- Masonry Walls (B.2.1.33)
- Structures Monitoring (B.2.1.34)

3.5.2.1.14 Yard Structures

Materials

The materials of construction for the Yard Structures components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Ductile Cast Iron
- Galvanized Steel
- Galvanized Steel Bolting
- Reinforced concrete

Environments

The Yard Structures components are exposed to the following environments:

- Air - Outdoor
- Concrete
- Groundwater/Soil
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Yard Structures components require management:

- Cracking
- Cracking and Distortion
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- 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 (Spalling, Scaling) and Cracking
- Loss of Preload

Aging Management Program

The following aging management program manages the aging effects for the Yard Structures components:

- Structures Monitoring (B.2.1.34)

3.5.2.2 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. For the Structures and Component Supports, those programs are addressed in the following subsections.

3.5.2.2.1 PWR and BWR Containments

3.5.2.2.1.1 Cracking and Distortion due to Increased Stress Levels from Settlement; Reduction of Foundation Strength, and Cracking due to Differential Settlement and Erosion of Porous Concrete Subfoundations

Cracking and distortion due to increased stress levels from settlement could occur in PWR and BWR concrete and steel containments. The existing program relies on ASME Section XI, Subsection IWL to manage these aging effects. Also, reduction of foundation strength and cracking, due to differential settlement and erosion of porous concrete subfoundations could occur in all types of PWR and BWR containments. The existing program relies on the structures monitoring program to manage these aging effects. However, some plants may rely on a de-watering system to lower the site ground water level. If the plant's current licensing basis (CLB) credits a de-watering system to control settlement, the GALL Report recommends further evaluation to verify the continued functionality of the de-watering system during the period of extended operation.

Item Number 3.5.1-1 is applicable to the LSCS Mark II concrete containment. The LSCS Primary Containment structures are founded on soil and therefore cracking and distortion due to settlement is potentially applicable. Cracking and distortion due to settlement has not been observed in LSCS concrete structures. Nevertheless, the ASME Section XI, Subsection IWL (B.2.1.30), and the Structures Monitoring (B.2.1.34) programs continue to monitor the concrete Primary Containment structures for cracking due to any mechanism. The condition of accessible and above grade Primary Containment and enclosing Reactor Building concrete is used as an indicator for the condition of the inaccessible and below grade structural components and provides reasonable assurance that degradation of inaccessible structural components will be detected before a loss of an intended function. Cracks extending into accessible areas including buttresses of the Primary Containment concrete elements, if any, will be managed by the ASME Section XI, Subsection IWL (B.2.1.30) program. In the event that unacceptable conditions due to this mechanism were identified in the accessible areas of structures, procedures require that extent of condition be determined and additional inspections or evaluations would address inaccessible and below grade portions of the structure. LSCS does not rely on a dewatering system to control settlement. Therefore no further evaluation is required.

Item Number 3.5.1-2 is not applicable to the LSCS Mark II concrete containment. LSCS does not utilize porous concrete subfoundation material and does not rely on a de-watering system to control settlement. A dewatering system is not relied upon to control settlement; therefore a further evaluation is not required.

3.5.2.2.1.2 Reduction of Strength and Modulus due to Elevated Temperature

Reduction of strength and modulus of concrete due to elevated temperatures could occur in PWR and BWR concrete and steel containments. The implementation of 10 CFR 50.55a and ASME Section XI, Subsection IWL would not be able to identify the reduction of strength and modulus of concrete due to elevated temperature. Subsection CC-3440 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The GALL Report recommends further evaluation of a plant-specific aging management program if any portion of the concrete containment components exceeds specified temperature limits, i.e., general area temperature greater than 66°C (150°F) and local area temperature greater than 93°C (200°F). Higher temperatures may be allowed if tests and/or calculations are provided to evaluate the reduction in strength and modulus of elasticity and these reductions are applied to the design calculations. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).

Item Number 3.5.1-3 is not applicable to the LSCS Mark II concrete containment. The LSCS Primary Containment bulk average bulk temperature does not exceed 150 degrees F. In addition, localized concrete temperatures exceeding 200 degrees F have not been reported. The Primary Containment Ventilation system maintains the containment drywell average air temperatures at less than 135 degrees F as required by Technical Specification limit. In addition, a cooling coil system is utilized between hot pipes and primary containment penetration sleeves as an added feature to reduce local concrete temperatures.

3.5.2.2.1.3 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 elements of inaccessible areas for all types of PWR and BWR containments. The existing program relies on ASME Section XI, Subsection IWE, and 10 CFR Part 50, Appendix J, to manage this aging effect. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect if corrosion is indicated from the IWE examinations. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).*

   Item Number 3.5.1-4 is not applicable to the LSCS Mark II concrete containment. This Item is applicable instead to Mark III containments. However, Item Number 3.5.1-5 is applicable to LSCS. The ASME Section XI, Subsection IWE (B.2.1.29) program and the 10 CFR Part 50, Appendix J (B.2.1.32) program will be used to manage the loss of material of steel elements in the inaccessible areas of the drywell liner, liner anchors, integral attachments, and embedded shell including the region shielded by the diaphragm floor. The LSCS Mark II concrete containment drywell and suppression pool design does not include large IWE liner or other surfaces which are inaccessible for inspection due to coverage by permanent insulation such as certain PWRs, nor does it include areas under a concrete floor slab as is common in Mark I containments and certain PWRs. The majority of the LSCS IWE surfaces, including the drywell head, are accessible for inspection. The coated liner surfaces are inspected for coating defects such as blisters that could indicate corrosion of the carbon steel liner. There are limited areas that are inaccessible for inspection which include the thickened embedded steel section covered by the outer edges of the concrete drywell floor, and also the suppression pool floor liner areas covered by the suppression pool columns and areas behind the suction strainers. The suppression chamber walls, floor, and ceiling are lined with stainless steel and are addressed in Item Number 3.5.1-37. The LSCS Mark II concrete containment design does not result in any air gap between the concrete and the liner, as the liner was the form for the concrete during construction. The LSCS BWR Mark II concrete containment design does not result in corrosive materials contacting the liner as is common in PWRs such as borated water or brackish service water. Additionally, the Primary Containment atmosphere is inert with nitrogen during operation. While some light general corrosion has been identified by IWE examinations in the drywell; it has not been significant. Areas of light corrosion noted in the drywell have been recoated or identified for coating maintenance. The suppression chamber walls, ceiling, floor, columns, and pedestal are lined with stainless steel and general, pitting and crevice corrosion have not been indicated from the IWE examinations of these surfaces. The concrete drywell floor has been monitored during IWL examinations for penetrating cracks near the junction with the liner and no cracking of the concrete floor or indication of corrosion in the inaccessible portion of the liner has been identified. For LSCS, no additional plant-specific activities are warranted beyond those described above and those that are currently established as part of the ASME Section XI, Subsection IWE (B.2.1.29) program. The continued monitoring of the containment liner in accordance with the ASME Section XI, Subsection IWE (B.2.1.29) program, and the testing conducted in accordance with the 10 CFR Part 50, Appendix J (B.2.1.32) program provide reasonable assurance that the loss of material due to corrosion of steel elements of the containment will be detected prior to a loss of intended function. These activities and programs provide assurance that the containment liner will remain capable of performing its design function through the period of extended operation.

2. *Loss of material due to general, pitting, and crevice corrosion could occur in steel torus shell of Mark I containments. The existing program relies on ASME Section XI, Subsection IWE, and 10 CFR Part 50, Appendix J, to manage this aging effect. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect if corrosion is significant. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).*

   Item Number 3.5.1-6 is not applicable to the LSCS Mark II concrete containment which utilizes a stainless steel lined suppression pool. This discussion paragraph is applicable to Mark I containments and the associated torus.

3. *Loss of material due to general, pitting, and crevice corrosion could occur in steel torus ring girders and downcomers of Mark I containments, downcomers of Mark II containments, and interior surface of suppression chamber shell of Mark III containments. The existing program relies on ASME Section XI, Subsection IWE to manage this aging effect. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect if corrosion is significant. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).*

Item Number 3.5.1-7 is not applicable to the LSCS Mark II concrete containment. This Item is applicable instead to Mark I and Mark III steel containments. The LSCS downcomers are stainless steel, and general, pitting and crevice corrosion have not been indicated from the IWE examinations of these surfaces. The ASME Section XI, Subsection IWE (B.2.1.29) program is used to manage the loss of material of the LSCS Mark II suppression chamber liner, downcomers, and vacuum relief valve piping and valves as addressed by Item Numbers 3.5.1-31 and 3.5.1-37.

3.5.2.2.1.4 Loss of Prestress due to Relaxation, Shrinkage, Creep, and Elevated Temperature

Loss of prestress forces due to relaxation, shrinkage, creep, and elevated temperature for PWR prestressed concrete containments and BWR Mark II prestressed concrete containments 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). The evaluation of this TLAA is addressed separately in Section 4.5, "Concrete Containment Tendon Prestress Analysis," of this SRP-LR.

Item Number 3.5.1-8 is applicable for LSCS. Loss of prestress forces due to relaxation, shrinkage, creep, and elevated temperature for the Primary Containment structures is an aging effect assessed by a time-limited aging analysis (TLAA). TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA evaluation of loss of prestress forces due to relaxation, shrinkage, creep, and elevated temperature for Primary Containment structures is discussed in LRA Section 4.5.

3.5.2.2.1.5 Cumulative Fatigue Damage

If included in the current licensing basis, fatigue analyses of suppression pool steel shells (including welded joints) and penetrations (including penetration sleeves, dissimilar metal welds, and penetration bellows) for all types of PWR and BWR containments and BWR vent header, vent line bellows, and downcomers are TLAAs as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.6, "Containment Liner Plates, Metal Containments, and Penetrations Fatigue Analysis," of this SRP-LR.

Item Number 3.5.1-9 is applicable for LSCS. 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). LSCS has no penetration bellows, torus vent line, vent line header, vent line bellows, unbraced downcomers, or vent header. The evaluation of fatigue as a TLAA for the LSCS Primary Containment liner and penetration sleeves, refueling bellows, and downcomers is addressed in Section 4.6.

3.5.2.2.1.6 Cracking due to Stress Corrosion Cracking

Cracking due to stress corrosion cracking of stainless steel penetration bellows and dissimilar metal welds could occur in all types of PWR and BWR containments. The existing program relies on ASME Section XI, Subsection IWE and10 CFR Part 50, Appendix J, to manage this aging effect. The GALL Report recommends further evaluation of additional appropriate examinations/evaluations implemented to detect these aging effects for stainless steel penetration bellows and dissimilar metal welds.

Item Number 3.5.1-10 is not applicable for LSCS penetration sleeves and penetration bellows. The LSCS Primary Containment design does not utilize penetration bellows. This item is also not applicable to the LSCS carbon steel and stainless steel penetration sleeves. While dissimilar welds and stainless steel penetrations exist; they are exposed to air-indoor or treated water and are not exposed to a corrosive environment. All the parameters necessary for SCC to occur are not present. Inspections of these penetrations are conducted in accordance with the ASME Section XI, Subsection IWE (B.2.1.29) program and the 10 CFR Part 50, Appendix J (B.2.1.32) program tests for leakage of these components. The dissimilar metal welds and stainless steel penetrations are located in an air-indoor uncontrolled or treated water environment which is not considered corrosive for stainless steel. LSCS and industry OE has not identified cracking due to SCC as an applicable aging effect for dissimilar metal welds or stainless steel on Mark II containment penetration sleeves in a BWR containment. Therefore no further evaluation is required.

3.5.2.2.1.7 Loss of Material (Scaling, Spalling) and Cracking due to Freeze-Thaw

Loss of material (scaling, spalling) and cracking due to freeze-thaw could occur in inaccessible areas of PWR and BWR concrete containments. The GALL Report recommends further evaluation of this aging effect for plants located in moderate to severe weathering conditions.

Item Number 3.5.1-11 is not applicable to the LSCS Primary Containment structures. The LSCS Primary Containment structures are completely enclosed and sheltered and protected within the air-indoor environment of the Reactor Building (secondary containment). The LSCS Primary Containment concrete is not subject to freezing temperature conditions in the Reactor Building air-indoor environment. Therefore, freeze-thaw is not applicable. A further evaluation is not required.

3.5.2.2.1.8 Cracking due to Expansion from Reaction with Aggregates

Cracking due to expansion from reaction with aggregates could occur in inaccessible areas of concrete elements of PWR and BWR concrete and steel containments. The GALL Report recommends further evaluation to determine if a plant-specific aging management program is required to manage this aging effect. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).

The Item Number 3.5.1-12 aging effect/mechanism is applicable to LSCS Primary Containment concrete structures. Concrete fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates used in concrete were performed in accordance with ASTM C227 and other ASTM standards tests to prevent use of reactive aggregates. In addition, concrete structures were constructed in accordance with ACI 318 per UFSAR Appendix E. However, NRC Information Notice 2011-20 indicates that the older ASTM standards used during construction may not always be effective in identifying reactive aggregates. The concrete Primary Containment is sheltered and protected from precipitation and weather within the Reactor Building and above grade concrete is not normally exposed to a source of moisture. The ASME Section XI, Subsection IWL (B.2.1.30) program continues to monitor the Primary Containment concrete for cracking and pattern cracking typical of expansion from reaction with aggregates or from cracking due to any mechanism. IWL concrete examinations have not identified the pattern cracking typical of expansion from reaction with aggregates, therefore no further evaluation is required for this aging effect for the inaccessible portions of Primary Containment concrete. Accessible areas of the Reactor Building and other concrete structures exposed to precipitation and other sources of moisture have not exhibited pattern cracking which could indicate a potential for cracking due to expansion from reaction with aggregates. LSCS will also examine exposed portions of below-grade concrete, when excavated for any reason, in accordance with the Structures Monitoring (B.2.1.34) program. The LSCS structural concrete was constructed as recommended to preclude cracking due to this mechanism; cracking due this mechanism has not been identified in accessible portions of the Primary Containment or other concrete plant structures; therefore, no additional aging management or further evaluation of inaccessible below grade concrete for this mechanism is required.

3.5.2.2.1.9 Increase in Porosity and Permeability due to Leaching of Calcium Hydroxide and Carbonation

Increase in porosity and permeability due to leaching of calcium hydroxide and carbonation could occur in inaccessible areas of concrete elements of PWR and BWR concrete and steel containments. The GALL Report recommends further evaluation if leaching is observed in accessible areas that impact intended functions. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).

Item Number 3.5.1-13 is not applicable to the LSCS Mark II concrete Primary Containments. This Item Number is not associated with the BWR Mark II concrete containment structure type. Item Number 3.5.1-14 is applicable to the LSCS. LSCS has not had any indication of significant leaching through the Primary Containment concrete, wall or basemat of the Mark II containment that could impact the intended function. The Primary Containment is completely enclosed and sheltered located within the air-indoor environment of the Reactor Building (secondary containment) and the interior of the primary containment drywell and suppression chamber are lined with steel and stainless steel respectively. No leaching has been observed in accessible areas of the Primary Containment that could have an impact on intended function; therefore, no additional aging management or further evaluation of inaccessible concrete for this mechanism is required.

3.5.2.2.2 Safety-Related and Other Structures and Component Supports

3.5.2.2.2.1 Aging Management of Inaccessible Areas

1. *Loss of material (spalling, scaling) and cracking due to freeze-thaw could occur in below-grade inaccessible concrete areas of Groups 1-3, 5 and 7-9 structures. The GALL Report recommends further evaluation of this aging effect for inaccessible areas of these Groups of structures for plants located in moderate to severe weathering conditions.*

Line Item 3.5.1-42 is applicable to LSCS structures. The Structures Monitoring (B.2.1.34) program will be used to manage loss of material (spalling, scaling) and cracking in both accessible and inaccessible areas. LSCS structures are located in a region where weathering conditions are considered severe as shown in ASTM C33. The loss of material (spalling, scaling) and cracking due to freeze-thaw is applicable to LSCS structures. However, these concrete structures are designed and constructed in accordance with ACI 318-71 and ACI 301-72 as described in the UFSAR. The design provides for low permeability and adequate air entrainment (3 percent to 5 percent) for concrete exposed to the air-outdoor environment such that the concrete has good freeze-thaw resistance. Fly Ash was also used in the concrete for much of the structures. Operating experience has not identified loss of material (spalling, scaling) and cracking due freeze-thaw of in scope reinforced concrete structures. Although operating experience has not identified loss of material and cracking due to freeze thaw, the Structures Monitoring (B.2.1.34) program includes inspection for these aging effects in the accessible areas. The condition of accessible and above grade concrete is used as an indicator for the condition of the inaccessible and below grade structural components and provides reasonable assurance that degradation of inaccessible structural components will be detected before a loss of an intended function. In addition, below grade concrete is either protected from freeze thaw or experiences fewer freeze thaw cycles than above grade concrete. In the event that unacceptable conditions due to freeze thaw are identified in the accessible areas of structures, procedures require that extent of condition be determined and additional inspections or evaluations would address inaccessible and below grade portions of any affected structure. In addition, LSCS will examine exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring (B.2.1.34) program.

2. *Cracking due to expansion and reaction with aggregates could occur in below-grade inaccessible concrete areas for Groups 1-5 and 7-9 structures. The GALL Report recommends further evaluation of inaccessible areas of these Groups of structures if concrete was not constructed in accordance with the recommendations in the GALL Report.*

   Item Number 3.5.1-43 is applicable to LSCS. Concrete fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates used in concrete were performed in accordance with ASTM C227 and other ASTM standards tests to prevent use of reactive aggregates. In addition concrete structures were constructed in accordance with ACI 318 per UFSAR Appendix E. However, NRC Information Notice 2011-20 indicates that the older ASTM standards used during construction may not always be effective in identifying reactive aggregates. The Structures Monitoring (B.2.1.34) program continues to monitor concrete structures for pattern cracking typical of expansion from reaction with aggregates or from cracking due to any mechanism. Accessible areas of the concrete structures exposed to precipitation and other sources of moisture have not exhibited pattern cracking which could indicate a potential for cracking due to expansion from reaction with aggregates. The LSCS structural concrete was constructed as recommended to preclude cracking due to this mechanism; cracking due this mechanism has not been identified in accessible portions of concrete plant structures; therefore, no additional aging management or further evaluation of inaccessible below grade concrete for this mechanism is required. Nevertheless, the Structures Monitoring (B.2.1.34) program continues to inspect and monitor concrete structures for cracking due to any mechanism. LSCS will also examine exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring (B.2.1.34) program.

3. *Cracking and distortion due to increased stress levels from settlement could occur in below-grade inaccessible concrete areas of structures for all Groups, and reduction in foundation strength, and cracking due to differential settlement and erosion of porous concrete subfoundations could occur in below-grade inaccessible concrete areas of Groups 1-3, 5 -9 structures. The existing program relies on structure monitoring programs to manage these aging effects. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.*

   Item Numbers 3.5.1-45 and 3.5.1-46 are not applicable to LSCS. LSCS structures do not utilize porous concrete subfoundations and do not rely on a de-watering system to control settlement. However, Item Number 3.5.1-44 is applicable to LSCS structures which are founded on soil. Cracking and distortion due to settlement has not been observed in LSCS concrete structures and the potential for settlement and distortion is considered insignificant for LSCS structures. Nevertheless, the Structures Monitoring program continues to inspect and monitor concrete structures for cracking due to any mechanism. The condition of accessible and above grade concrete is used as an indicator for the condition of the inaccessible and below grade structural components and provides reasonable assurance that degradation of inaccessible structural components will be detected before a loss of an intended function. In the event that unacceptable conditions due to this mechanism were identified in the accessible areas of structures, procedures require that extent of condition be determined and additional inspections or evaluations would address inaccessible and below grade portions of any affected structure. However, LSCS will examine exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring (B.2.1.34) program. No further evaluation of this aging effect and mechanism is required as LSCS did not use porous concrete subfoundations, does not rely on a dewatering system to control settlement, and continues to inspect and monitor in scope concrete structures for cracking due to any mechanism.

4. *Increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation could occur in below-grade inaccessible concrete areas of Groups 1-5 and 7-9 structures. The GALL Report recommends further evaluation if leaching is observed in accessible areas that impact intended functions.*

   Item Number 3.5.1-47 is applicable to LSCS. The Structures Monitoring (B.2.1.34) program will be used to manage increase in porosity and permeability; loss of strength for concrete and exterior above and below grade accessible and inaccessible concrete and foundations. Leaching of calcium hydroxide is applicable for a flowing water environment, which may occur to a limited extent in accessible or inaccessible portions of in scope structures due to the potential for groundwater intrusion through narrow concrete cracks. Recent monitoring of groundwater chemistry at LSCS has revealed that groundwater is not aggressive. The effects of carbonation have not been observed on LSCS concrete. Although some leaching has been observed in the accessible areas it is not significant and has not impacted intended functions. LSCS reinforced concrete is designed and constructed to meet ACI and ASTM Specifications including ACI 318 and ACI 301 including the use of flyash for most concrete structures to produce durable concrete as described in the UFSAR. Therefore, managing the aging effect of increase in porosity and permeability; loss of strength for concrete are not required for inaccessible areas of in scope structures. However, LSCS will continue periodic groundwater testing and will examine exposed portions of the below-grade concrete, when excavated for any reason, in accordance with the Structures Monitoring program. The Structures Monitoring program is described in Appendix B.

3.5.2.2.2.2 Reduction of Strength and Modulus due to Elevated Temperature

Reduction of strength and modulus of concrete due to elevated temperatures could occur in PWR and BWR Group 1-5 concrete structures. For any concrete elements that exceed specified temperature limits, further evaluations are recommended. Appendix A of ACI 349-85 specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 66°C (150°F) except for local areas, which are allowed to have increased temperatures not to exceed 93°C (200°F). The GALL Report recommends further evaluation of a plant-specific program if any portion of the safety-related and other concrete structures exceeds specified temperature limits, i.e., general area temperature greater than 66°C (150°F) and local area temperature greater than 93°C (200°F). Higher temperatures may be allowed if tests and/or calculations are provided to evaluate the reduction in strength and modulus of elasticity and these reductions are applied to the design calculations. The acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).

Item Number 3.5.1-48 is not applicable to LSCS. LSCS Group 2 thru 5 concrete structures are not subject to general area temperatures greater than 150 degrees Fahrenheit. In addition local temperatures in excess of 200 degrees Fahrenheit have not been reported at LSCS. The LSCS Reactor Building has a steel superstructure and as such is a Group 2 rather than a Group 1 structure. The Technical Specification and UFSAR limit the bulk average temperature to 135 degrees Fahrenheit for Group 4 structures within the Primary Containment. The bulk average temperature for Group 4 structures is maintained within the Technical Specification limits by recirculating air through the Primary Containment Ventilation System. Group 5 structures, i.e., refuel floor and spent fuel storage pool are part of the Reactor Building which is a Group 2 structure. The spent fuel pool water temperature is maintained at or below 140 degrees Fahrenheit under normal plant operating conditions. Process piping operating at temperatures greater than 200 degrees Fahrenheit is insulated through penetrations. The insulation in combination with compartment air circulation reduces concrete local temperature to less than 200 degrees Fahrenheit. Plant operating experience has not identified elevated general and local area temperature as a concern for concrete structural components.

3.5.2.2.2.3 Aging Management of Inaccessible Areas for Group 6 Structures

The GALL Report recommends further evaluation for inaccessible areas of certain Group 6 structure/aging effect combinations as identified below, whether or not they are covered by inspections in accordance with the GALL Report, Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," or FERC/US Army Corp of Engineers dam inspection and maintenance procedures.

1. *Loss of material (spalling, scaling) and cracking due to freeze-thaw could occur in below-grade inaccessible concrete areas of Group 6 structures. The GALL Report recommends further evaluation of this aging effect for inaccessible areas for plants located in moderate to severe weathering conditions.*

   Item Number 3.5.1-49 is applicable to LSCS. The Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage loss of material (spalling, scaling) and cracking in both accessible and inaccessible areas. LSCS Group 6 structures are located in a region where weathering conditions are considered severe as shown in ASTM C33. The loss of material (spalling, scaling) and cracking due to freeze-thaw is applicable to LSCS concrete structures. However, these concrete structures are designed and constructed in accordance with ACI 318-71 and ACI 301-72 as described in the UFSAR. The design provides for low permeability and adequate air entrainment (3 percent to 5 percent) in the air-outdoor environment such that the concrete has good freeze-thaw resistance. Structural concrete has not exhibited loss of material (spalling, scaling) and cracking due to freeze-thaw in accessible areas of in scope reinforced concrete structures. Although operating experience has not identified loss of material and cracking due to freeze-thaw, the Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program includes inspection for these aging effects in the accessible areas. The condition of accessible and above grade concrete is used as an indicator for the condition of the inaccessible and below grade structural components and provides reasonable assurance that degradation of inaccessible structural components will be detected before a loss of an intended function. In addition, LSCS examines exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring (B.2.1.34) program.

2. *Cracking due to expansion and reaction with aggregates could occur in below-grade inaccessible reinforced concrete areas of Group 6 structures. The GALL Report recommends further evaluation to determine if a plant-specific aging management program is required to manage this aging effect. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).*

   Item Number 3.5.1-50 is applicable to LSCS. Concrete fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates used in concrete were performed in accordance with ASTM C227 and other ASTM standards tests to prevent use of reactive aggregates. In addition concrete structures were constructed in accordance with ACI 318 per UFSAR Appendix E. However, NRC Information Notice 2011-20 indicates that the older ASTM standards used during construction may not always be effective in identifying reactive aggregates. The Structures Monitoring (B.2.1.34) program continues to monitor concrete structures including Group 6 structures for pattern cracking typical of expansion from reaction with aggregates and cracking due to any mechanism. Structures Monitoring (B.2.1.34) program concrete examinations have not identified the pattern cracking typical of expansion from reaction with aggregates in the accessible concrete, therefore no further evaluation is required for this aging effect for the inaccessible portions of structural concrete. Accessible areas of the Cooling Lake, Lake Screen House and other concrete structures exposed to precipitation and other sources of moisture have not exhibited pattern cracking which could indicate a potential for cracking due to expansion from reaction with aggregates. Therefore, no additional aging management or further evaluation of inaccessible and below grade concrete for this mechanism is required. Nevertheless, the Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) and Structures Monitoring (B.2.1.34) programs continue to inspect and monitor group 6 and other concrete structures for cracking due to any mechanism. LSCS will also examine exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring (B.2.1.34) program. No additional aging management or further evaluation of inaccessible Group 6 below grade concrete for this mechanism is required.

3. *Increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation could occur in inaccessible areas of concrete elements of Group 6 structures. The GALL Report recommends further evaluation if leaching is observed in accessible areas that impact intended functions. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).*

   Item Number 3.5.1-51 is applicable to LSCS. The Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage increase in porosity and permeability; loss of strength accessible Group 6 structures concrete. Leaching of calcium hydroxide is applicable for a flowing water environment; therefore, the potential for leaching to occur due to the water flowing environment is considered. Recent monitoring of the groundwater and Cooling Lake water chemistry at LSCS has revealed that the groundwater and Cooling Lake water are not aggressive. Therefore, an increase in porosity and permeability due to leaching of calcium hydroxide is not expected to be significant for the Group 6 structures at LSCS. Leaching of calcium hydroxide is applicable for a flowing water environment, which may occur to a limited extent in accessible and inaccessible portions of in scope structures. Water flowing over the surface of the concrete in the Lake Screen House, Cooling Lake, and in the service water tunnel has not resulted in significant leaching. The effects of carbonation have not been observed on LSCS concrete. Operating experience at LSCS has found that increase in porosity and permeability and loss of strength due to these mechanisms is not significant and is adequately managed by the Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) and the Structures Monitoring (B.2.1.34) program. LSCS reinforced concrete is designed and constructed to meet ACI and ASTM Specifications including ACI 318 and constructed in accordance with ACI 301 to produce durable concrete as described in the UFSAR. Therefore, no additional measures for managing the aging effect of increase in porosity and permeability; loss of strength for concrete are required for inaccessible areas of Group 6 structures. LSCS will examine exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring (B.2.1.34) program.

3.5.2.2.2.4 Cracking due to Stress Corrosion Cracking, and Loss of Material due to Pitting and Crevice Corrosion

Cracking due to stress corrosion cracking and loss of material due to pitting and crevice corrosion could occur for Group 7 and 8 stainless steel tank liners exposed to standing water. The GALL Report recommends further evaluation of plant-specific programs to manage these aging effects. The acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of this SRP-LR).

Item Number 3.5.1-52 is not applicable. LSCS does not have Group 7 and 8 stainless steel tank liners exposed to standing water.

3.5.2.2.2.5 Cumulative Fatigue Damage due to Fatigue

Fatigue of component support members, anchor bolts, and welds for Groups B1.1, B1.2, and B1.3 component supports is a TLAA as defined in 10 CFR 54.3 only if a CLB fatigue analysis exists. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.3, "Metal Fatigue Analysis," of this SRP-LR.

The Item Number 3.5.1-53 is not applicable to LSCS. The LSCS current licensing basis contains no fatigue analysis for support members, bolted connections, or supported anchorage to building structures. Therefore, a TLAA is not required to be evaluated in accordance with 10 CFR 54.21(c) for these components.

3.5.2.2.3 Quality Assurance for Aging Management of Nonsafety-Related Components

Acceptance criteria are described in Branch Technical Position IQMB-1 (Appendix A.2 of this SRP-LR).

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.5.2.2.4 Ongoing Review of Operating Experience

Ongoing review of operating experience is addressed in Appendix A, Section A.1.6 and Appendix B, Section B.1.4.

3.5.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Structures and Component Supports:

- Section 4.5, Concrete Containment Tendon Prestress Analyses
  - Section 4.5.1, Concrete Containment Tendon Prestress Analyses
- Section 4.6, Primary Containment Fatigue Analyses
  - Section 4.6.1, Primary Containment Liner and Penetrations Fatigue Analyses
  - Section 4.6.2, Primary Containment Refueling Bellows Fatigue Analysis
  - Section 4.6.3, Primary Containment Downcomer Vents Fatigue Analysis

3.5.3 CONCLUSION

The Structures and Component Supports that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Structures and Component Supports are identified in the summaries in Section 3.5.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Structures and Component Supports components will be adequately managed so that there is reasonable assurance that the intended functions are maintained consistent with the current licensing basis during the period of extended operation.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-1	Concrete: dome; wall; basemat; ring girders; buttresses, Concrete elements, all	Cracking and distortion due to increased stress levels from settlement	Chapter XI.S2, “ASME Section XI, Subsection IWL” or Chapter XI.S6, "Structure Monitoring" 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 a de-watering system is relied upon to control settlement	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage cracking and distortion for the concrete foundation, subfoundation, and basemat inaccessible concrete elements of the Primary Containment exposed to groundwater and soil environments. Cracks extending into accessible and inaccessible areas, of the Primary Containment concrete wall and concrete elements, including buttresses, will also be managed by the ASME Section XI, Subsection IWL (B.2.1.30) program. The LSCS Mark II Primary Containment has a steel head, therefore no concrete dome exists, and no concrete ring girders exist. LSCS does not rely on a dewatering system to control settlement. Therefore no further evaluation is required. See subsection 3.5.2.2.1.1.
3.5.1-2	Concrete: foundation; subfoundation	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	Chapter XI.S6, “Structures Monitoring” If a de-watering system is relied upon for control of erosion, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if a de-watering system is relied upon to control settlement	Not Applicable. LSCS does not utilize a porous concrete subfoundation material or rely on a dewatering system to control settlement. Therefore this aging effect and mechanism are not applicable to the LSCS Primary Containment structures. See subsection 3.5.2.2.1.1.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-3	Concrete: dome; wall; basemat; ring girders; buttresses, Concrete: containment; wall; basemat, Concrete: basemat, concrete fill-in annulus	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	A plant-specific aging management program is to be evaluated.	Yes, if temperature limits are exceeded	Not Applicable. The average temperature inside the Primary Containment structure at LSCS is maintained less than 135°F, in accordance with Technical Specification limits, by the Primary Containment Ventilation System. Localized concrete temperatures exceeding 200˚F have not been reported. In addition, a cooling coil system is utilized between hot pipes and primary containment penetration sleeves as an added feature to reduce local concrete temperatures. See subsection 3.5.2.2.1.2.
3.5.1-4	Steel elements (inaccessible areas): drywell shell; drywell head; and drywell shell	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE,” and Chapter XI.S4, “10 CFR Part 50, Appendix J”	Yes, if corrosion is indicated from the IWE examinations	Not Applicable. This item is associated with Mark III containments. LSCS is a Mark II concrete containment design. The loss of material for comparable LSCS components is addressed in Item Number 3.5.1-5. See subsection 3.5.2.2.1.3.1.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-5	Steel elements (inaccessible areas): liner; liner anchors; integral attachments, Steel elements (inaccessible areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE” and Chapter XI.S4, “10 CFR Part 50, Appendix J”	Yes, if corrosion is indicated from the IWE examinations	Consistent with NUREG-1801. The ASME Section XI, Subsection IWE (B.2.1.29) program and the 10 CFR Part 50, Appendix J (B.2.1.32) program will be used to manage the loss of material of steel elements (inaccessible areas), drywell liner, liner anchors, integral attachments, including region shielded by diaphragm floor. The LSCS suppression chamber is lined with stainless steel and is addressed in Item Number 3.5.1-37. The drywell head is accessible and is addressed in Item Number 3.5.1-35. See subsection 3.5.2.2.1.3.1.
3.5.1-6	Steel elements: torus shell	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE” and Chapter XI.S4, “10 CFR Part 50, Appendix J”	Yes, if corrosion is significant Recoating of the torus is recommended.	Not Applicable. This Item Number is applicable to Mark I steel containments. LSCS design employs the drywell/pressure suppression features of the BWR Mark II concrete containment concept. The primary containment drywell is a steel-lined prestressed concrete and the suppression pool is stainless steel lined prestressed concrete of the over-and-under pressure-suppression system configuration. See subsection 3.5.2.2.1.3.2.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-7	Steel elements: torus ring girders; downcomers;, Steel elements: suppression chamber shell (interior surface)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE"	Yes, if corrosion is significant	Not Applicable. These line items are applicable to steel Mark I or steel Mark III containments. The LSCS design employs the drywell/pressure suppression features of the BWR Mark II containment concept. The primary containment is prestressed concrete with a steel lined drywell and stainless steel lined suppression chamber of the over-and-under pressure-suppression system configuration. See subsection 3.5.2.2.1.3.3.
3.5.1-8	Prestressing system: tendons	Loss of prestress due to relaxation; shrinkage; creep; elevated temperature	Yes, TLAA	Yes, TLAA	Consistent with NUREG-1801. Loss of prestress forces of containment prestressing system tendons is an aging effect assessed by a TLAA. See subsection 3.5.2.2.1.4.
3.5.1-9	Penetration sleeves; penetration bellows, Steel elements: torus; vent line; vent header; vent line bellows; downcomers, Suppression pool shell; unbraced downcomers, Steel elements: vent header; downcomers	Cumulative fatigue damage due to fatigue (Only if CLB fatigue analysis exists)	Yes, TLAA	Yes, TLAA	Consistent with NUREG-1801. Fatigue is a TLAA. LSCS does not have all the components listed for this line item (some of which are for other containment types. LSCS has no penetration bellows, torus vent line, vent line header, vent line bellows, unbraced downcomers, or vent header. Further evaluation is documented in subsection 3.5.2.2.1.5.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-10	Penetration sleeves; penetration bellows	Cracking due to stress corrosion cracking	Chapter XI.S1, "ASME Section XI, Subsection IWE," and Chapter XI.S4, "10 CFR Part 50, Appendix J"	Yes, detection of aging effects is to be evaluated	Not Applicable. The LSCS design does not utilize penetration bellows. This Item is also not applicable to the LSCS penetration sleeves which are carbon steel and stainless steel. LSCS OE has not identified cracking due to SCC as an applicable aging effect for penetration sleeves (dissimilar metal welds and stainless steel sleeves) in the indoor-air or treated water environments of BWR primary containments. See subsection 3.5.2.2.1.6
3.5.1-11	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses, Concrete (inaccessible areas): basemat, Concrete (inaccessible areas): dome; wall; basemat	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Further evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, for plants located in moderate to severe weathering conditions	Not Applicable. The Primary Containment is completely enclosed and sheltered within the air-indoor environment of the Reactor Building (secondary containment). Therefore cracking and freeze-thaw is not applicable. See subsection 3.5.2.2.1.7.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-12	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses, Concrete (inaccessible areas): basemat, Concrete (inaccessible areas): containment; wall; basemat, Concrete (inaccessible areas): basemat, concrete fill-in annulus	Cracking due to expansion from reaction with aggregates	Further evaluation is required to determine if a plant-specific aging management program is needed.	Yes, if concrete is not constructed as stated function	Consistent with NUREG-1801. The ASME Section XI, Subsection IWL (B.2.1.30) and the Structures Monitoring (B.2.1.34) program will be used to manage cracking in inaccessible areas of the primary containment concrete. Concrete fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates used in concrete were performed in accordance with ASTM C227 and other ASTM standards tests to prevent use of reactive aggregates. In addition concrete structures were constructed in accordance with ACI 318. The LSCS Mark II primary containment design does not utilize certain components which are included in this GALL line item listing for other containment designs. LSCS has no concrete dome, ring girders, or concrete fill-in annulus. See subsection 3.5.2.2.1.8

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-13	Concrete (inaccessible areas): basemat, Concrete (inaccessible areas): dome; wall; basemat	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Further evaluation is required to determine if a plant-specific aging management program is needed.	Yes, if leaching is observed in accessible areas that impact intended function	Not Applicable. The aging effect/mechanism does not apply to the LSCS Primary Containment structures. LSCS is a BWR Mark II concrete containment. This Item Number is not associated with the BWR Mark II Concrete Containment structure type. Inspections of LSCS Primary Containment structures have not identified any leaching in the accessible primary containment areas that may impact the intended function. The primary containment is completely enclosed and sheltered located within the air-indoor environment of the Reactor Building (secondary containment) and the interior of the primary containment is lined with steel and stainless steel. See subsection 3.5.2.2.1.9.
3.5.1-14	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses, Concrete (inaccessible areas): containment; wall; basemat	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Further evaluation is required to determine if a plant-specific aging management program is needed.	Yes, if leaching is observed in accessible areas that impact intended function	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage increase in porosity and permeability and loss of strength of the concrete wall, basemat, and buttresses in inaccessible areas of the Primary Containment structure exposed to a flowing water environment. The LSCS Mark II concrete containment design does not include a concrete dome or concrete ring girders. No leaching has been observed in accessible areas of the Primary Containment that could have an impact on intended function. See subsection 3.5.2.2.1.9.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-15	Concrete (accessible areas): basemat	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Chapter XI.S2, "ASME Section XI, Subsection IWL"	No	Not Applicable. The component, material, environment, and aging effect/mechanism combination does not apply. LSCS is a BWR Mark II concrete containment. This Item Number is not associated with the BWR Mark II Concrete Containment structure type. See item 3.5.1-20 for the comparable item for LSCS.
3.5.1-16	Concrete (accessible areas): basemat, Concrete: containment; wall; basemat	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	Chapter XI.S2, "ASME Section XI, Subsection IWL," or Chapter XI.S6, "Structures Monitoring"	No	Not Applicable. The component, material, environment, and aging effect/mechanism combination does not apply. LSCS does not have an aggressive chemical environment indoors that may come in contact with internal concrete surfaces for concrete (accessible areas): basemat, concrete containment, wall basemat. The outdoor-air environment is not applicable to the LSCS Primary Containments, which are completely enclosed by the Reactor Buildings.
3.5.1-17	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	Chapter XI.S2, "ASME Section XI, Subsection IWL"	No	Not Applicable. The component, material, environment, and aging effect/mechanism combination does not apply. This Item Number is not associated with BWR Mark II Concrete Containment types. LSCS does not have an aggressive chemical environment indoors that may come in contact with concrete surfaces.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-18	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses, Concrete (accessible areas): basemat	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Chapter XI.S2, "ASME Section XI, Subsection IWL"	No	Not Applicable. The component, material, environment, and aging effect/mechanism combination does not apply. This Item Number is not associated with BWR Mark II Concrete Containment types. LSCS does not have any primary containment concrete areas subject to the air-outdoor environment.
3.5.1-19	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses, Concrete (accessible areas): basemat, Concrete (accessible areas): containment; wall; basemat, Concrete (accessible areas): basemat, concrete fill-in annulus	Cracking due to expansion from reaction with aggregates	Chapter XI.S2, "ASME Section XI, Subsection IWL"	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWL (B.2.1.30) program will be used to manage cracking of the Concrete (accessible areas): Containment Wall (including buttresses), and concrete Reactor Cavity contiguous fuel pool walls with tendons, Foundation, subfoundation (includes ceiling of tendon access tunnel); concrete interior: drywell floor, cavity floor, pedestal, exposed to air - indoor uncontrolled for the Primary Containment. The LSCS Mark II Primary Containment has a steel drywell head and a concrete dome, concrete ring girders, and concrete fill-in annulus are not applicable to this Primary Containment. Cracking associated with expansion due to reaction with aggregates has not been observed on accessible portions of the LSCS Primary Containment structures which additionally are completely enclosed and sheltered by the Reactor Buildings.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-20	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses, Concrete (accessible areas): containment; wall; basemat	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Chapter XI.S2, "ASME Section XI, Subsection IWL"	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWL (B.2.1.30) program will be used to manage increase in porosity and permeability, loss of strength of the reinforced concrete elements exposed to water - flowing in the Primary Containment. The LSCS Mark II design does not utilize a concrete dome or concrete ring girders. The primary containment walls are completely enclosed and sheltered and protected within the Reactor Buildings.
3.5.1-21	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses; reinforcing steel, Concrete (accessible areas): basemat; reinforcing steel, Concrete (accessible areas): dome; wall; basemat; reinforcing steel	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	Chapter XI.S2, "ASME Section XI, Subsection IWL"	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWL (B.2.1.30) program will be used to manage cracking, loss of bond, and loss of material (spalling, scaling) of the Concrete (accessible areas): containment wall (including buttresses, Foundation, subfoundation (including ceiling of tendon access tunnel) and reactor cavity contiguous fuel pool walls with tendons; concrete interior: drywell floor and cavity floor, and pedestal exposed to air - indoor Uncontrolled for the Primary Containment. The LSCS Mark II design does not utilize a concrete dome or concrete ring girders. The primary containment walls are completely enclosed and sheltered and protected within the Reactor Buildings.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-22	Concrete (inaccessible areas): basemat; reinforcing steel	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage cracking, loss of bond, and loss of material (spalling, scaling) of the concrete elements (inaccessible areas): containment wall, concrete: foundation, subfoundation, and basemat with embedded reinforcing steel exposed to air - indoor uncontrolled for the Primary Containment.
3.5.1-23	Concrete (inaccessible areas): basemat; reinforcing steel, Concrete (inaccessible areas): dome; wall; basemat; reinforcing steel	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	Chapter XI.S2, “ASME Section XI, Subsection IWL,” or Chapter XI.S6, "Structures Monitoring"	No	Not Applicable. This Item Number is not associated with BWR Mark II Concrete Containment types. Inaccessible portions of the LSCS Primary Containment concrete are addressed in 3.5.1-22.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-24	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses, Concrete (inaccessible areas): basemat, Concrete (accessible areas): dome; wall; basemat	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	Chapter XI.S2, "ASME Section XI, Subsection IWL," or Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage increase in porosity and permeability, cracking, loss of material (spalling, scaling) of the concrete (inaccessible areas): foundation, subfoundation, basemat exposed to groundwater/soil for the Primary Containment. The LSCS Primary Containment basemat is in contact with groundwater and soil which is not aggressive. The LSCS Mark II design does not utilize a concrete dome or concrete ring girders. No aggressive chemicals are present in the LSCS air indoor environment that could attack the LSCS Primary Containment concrete which is completely enclosed and sheltered by the Reactor Buildings.
3.5.1-25	PWRs only.				
3.5.1-26	Moisture barriers (caulking, flashing, and other sealants)	Loss of sealing due to wear, damage, erosion, tear, surface cracks, or other defects	Chapter XI.S1, "ASME Section XI, Subsection IWE"	No	Not Applicable. The component, material, environment, and aging effect/mechanism combination does not apply. The LSCS Primary Containment design does not utilize a caulked or sealed moisture barrier at the concrete to steel interface.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-27	penetration sleeves; penetration bellows, Steel elements: torus; vent line; vent header; vent line bellows; downcomers, Suppression pool shell	Cracking due to cyclic loading (CLB fatigue analysis does not exist)	Chapter XI.S1, "ASME Section XI, Subsection IWE," and Chapter XI.S4, "10 CFR Part 50, Appendix J"	No	Not Applicable. LSCS does have a CLB fatigue analysis associated with penetration sleeves and downcomers, and therefore this aging effect and mechanism is addressed under Item Number 3.5.1-9.
3.5.1-28	Personnel airlock, equipment hatch, CRD hatch	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE," and Chapter XI.S4, "10 CFR Part 50, Appendix J"	No	Consistent with NUREG-1801. The 10 CFR Part 50, Appendix J (B.2.1.32) and ASME Section XI, Subsection IWE (B.2.1.29) programs will be used to manage loss of material of the carbon steel hatches/plugs and personnel airlock, equipment hatch, CRD hatch exposed to air - indoor uncontrolled for the Primary Containment.
3.5.1-29	Personnel airlock, equipment hatch, CRD hatch: locks, hinges, and closure mechanisms	Loss of leak tightness due to mechanical wear of locks, hinges and closure mechanisms	Chapter XI.S1, "ASME Section XI, Subsection IWE," and Chapter XI.S4, "10 CFR Part 50, Appendix J"	No	Consistent with NUREG-1801. The 10 CFR Part 50, Appendix J (B.2.1.32) and ASME Section XI, Subsection IWE (B.2.1.29) programs will be used to manage loss of leak tightness of the carbon steel personnel airlock, equipment hatch: locks, hinges, and closure mechanisms exposed to air - indoor uncontrolled for the Primary Containment.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-30	Pressure-retaining bolting	Loss of preload due to self-loosening	Chapter XI.S1, “ASME Section XI, Subsection IWE,” and Chapter XI.S4, "10 CFR Part 50, Appendix J"	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWE (B.2.1.29) program and the 10 CFR Part 50, Appendix J (B.2.1.32) program will be used to manage loss of preload of the carbon and low alloy steel and stainless steel pressure-retaining bolting (containment closure) and vacuum relief line pipe flange bolting exposed to air - indoor uncontrolled for the Primary Containment.
3.5.1-31	Pressure-retaining bolting, Steel elements: downcomer pipes	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE”	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWE (B.2.1.29) program will be used to manage loss of material of the carbon and low alloy steel and carbon steel pressure-retaining bolting for containment closure and vacuum relief line pipe flanges bolting, as well as, for steel elements including downcomer jet deflectors, drywell floor penetration sleeves: (including closure rings, plates and caps), and downcomer bracing exposed to air - indoor uncontrolled and treated water in the Primary Containment. Downcomer pipes at LSCS are stainless steel and are addressed under Item Number 3.5.1-37.
3.5.1-32	Prestressing system: tendons; anchorage components	Loss of material due to corrosion	Chapter XI.S2, “ASME Section XI, Subsection IWL”	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWL (B.2.1.30) program will be used to manage loss of material of the carbon steel prestressing system: anchorage components, grease cap at tendon anchorage, and tendons exposed to air - indoor uncontrolled for these Primary Containment structural components.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-33	Seals and gaskets	Loss of sealing due to wear, damage, erosion, tear, surface cracks, or other defects	Chapter XI.S4, “10 CFR Part 50, Appendix J "	No	Consistent with NUREG-1801. The 10 CFR Part 50, Appendix J (B.2.1.32) program will be used to manage loss of sealing of the elastomer electrical penetration assemblies (includes penetration sleeves and closure plates) and other seals and gaskets exposed to air - indoor uncontrolled for the Primary Containment.
3.5.1-34	Service Level I coatings	Loss of coating integrity due to blistering, cracking, flaking, peeling, or physical damage	Chapter XI.S8, "Protective Coating Monitoring and Maintenance"	No	Consistent with NUREG-1801. The Protective Coating Monitoring and Maintenance Program (B.2.1.36) program will be used to manage loss of coating integrity of the service level I coatings (containment boundary) and service level I coatings (internal structures) exposed to air - indoor uncontrolled in the Primary Containment.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-35	Steel elements (accessible areas): liner; liner anchors; integral attachments, Penetration sleeves, Steel elements (accessible areas): drywell shell; drywell head; drywell shell in sand pocket regions;, Steel elements (accessible areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable), Steel elements (accessible areas): drywell shell; drywell head	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE,” and Chapter XI.S4, “10 CFR Part 50, Appendix J”	No	Consistent with NUREG-1801. The 10 CFR Part 50, Appendix J (B.2.1.32) and ASME Section XI, Subsection IWE (B.2.1.29) programs will be used to manage loss of material of the carbon steel concrete embedments, electrical penetration assemblies (includes penetration sleeves and closure plates), mechanical penetrations (includes penetration sleeves, flued heads, and closure plates for pipe and instrument penetrations), steel elements (accessible areas): drywell head, drywell liner, liner anchors, integral attachments, ring girder assembly (includes cone skirt) , vacuum breaker valves, isolation valves, and piping exposed to air - indoor uncontrolled and treated water in the Primary Containment. The embedded shell region shielded by the diaphragm floor is inaccessible and is not applicable to this line item but is addressed under Item Number 3.5.1-41
3.5.1-36	Steel elements: drywell head; downcomers	Fretting or lockup due to mechanical wear	Chapter XI.S1, “ASME Section XI, Subsection IWE”	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWE (B.2.1.29) program will be used to manage fretting or lockup of the carbon steel, steel elements: drywell head exposed to air - indoor uncontrolled in the Primary Containment. Fretting or lockups are not applicable to the supports and connection types for the LSCS downcomers.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-37	Steel elements: suppression chamber (torus) liner (interior surface)	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE," and Chapter XI.S4, "10 CFR Part 50, Appendix J"	No	Consistent with NUREG-1801. The 10 CFR Part 50, Appendix J (B.2.1.32) and ASME Section XI, Subsection IWE (B.2.1.29) program will be used to manage loss of material of the stainless steel and stainless steel bolting, bolting (containment closure), electrical penetration assemblies (includes penetration sleeves and closure plates), hatches/plugs, mechanical penetrations (includes penetration sleeves, flued heads, and closure plates for pipe and instrument penetrations), steel elements: suppression chamber liner, liner anchors, integral attachments exposed to air - indoor uncontrolled and treated water in the Primary Containment. The ASME Section XI, Subsection IWE (B.2.1.29) program (used by itself) has been substituted for the use of both the 10 CFR Part 50, Appendix J (B.2.1.32) and ASME Section XI, Subsection IWE (B.2.1.29) programs together, to manage loss of material for the stainless steel drywell floor liner, stainless steel cavity slab liner, stainless steel drywell floor penetrations, stainless steel downcomers, and stainless steel pedestal liner exposed to air - indoor uncontrolled and treated water in the Primary Containment. 10 CFR 50 Appendix J pressure testing is not applicable to these components. The Structures Monitoring program (B.2.1.34) is substituted to manage the loss of material of the stainless steel liner for the suppression pool concrete columns exposed to air-indoor uncontrolled and treated water environments in the Primary Containment. The liners for these concrete

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					columns are non-pressure boundary components.
3.5.1-38	Steel elements: suppression chamber shell (interior surface)	Cracking due to stress corrosion cracking	Chapter XI.S1, "ASME Section XI, Subsection IWE," and Chapter XI.S4, "10 CFR Part 50, Appendix J"	No	Not Applicable. This Item Number is applicable to stainless steel suppression chamber shells of Mark III containments. The LSCS Mark II concrete containment suppression chamber liner interior surface is addressed by Item Number 3.5.1-37.
3.5.1-39	Steel elements: vent line bellows	Cracking due to stress corrosion cracking	Chapter XI.S1, "ASME Section XI, Subsection IWE," and Chapter XI.S4, "10 CFR Part 50, Appendix J"	No	Not Applicable. This Item Number is applicable to Mark I steel containment types. The component, material, environment, and aging effect/mechanism combination does not apply to the LSCS Mark II concrete primary containment design as no vent line bellows exist.
3.5.1-40	Unbraced downcomers, Steel elements: vent header; downcomers	Cracking due to cyclic loading (CLB fatigue analysis does not exist)	Chapter XI.S1, "ASME Section XI, Subsection IWE"	No	Not Applicable. LSCS has braced downcomers. There is no vent line header applicable to the LSCS Primary Containment design. A CLB fatigue analysis does exist for the downcomers. A TLAA associated with postulated cracking of downcomers is addressed under Item Number 3.5.1-9.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-41	Steel elements: drywell support skirt, Steel elements (inaccessible areas): support skirt	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. This line item has been used for embedded steel components within concrete (anchors, conduit, penetration sleeves, concrete embedments, and other steel components. Steel components contained within concrete do not require an aging management program as described in the GALL report.
3.5.1-42	Groups 1-3, 5, 7-9:Concrete (inaccessible areas): foundation	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Further evaluation is required for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557)	Yes, for plants located in moderate to severe weathering conditions (See subsection 3.5.2.2.2.1.1)	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of material (spalling, scaling) and cracking of the reinforced concrete in inaccessible areas exposed to an air – outdoor environment in Groups 1-3 structures. LSCS does not have Group 5 and 7-9 structures with concrete inaccessible areas subject to an air-outdoor environment. The LSCS structural concrete air content varied according to mix design and aggregate size. However, the total air content was limited to not less than 3 percent and not more than 5 percent for concrete inaccessible areas exposed to the air-outdoor environment. Structural concrete in accessible areas for In scope structures has exhibited no signs of loss of material (spalling, scaling) and cracking due this mechanism. Although these conditions have not been documented in operating experience, inspection for this aging effect is performed. See subsection 3.5.2.2.2.1.1.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-43	All Groups except Group 6:Concrete (inaccessible areas): all	Cracking due to expansion from reaction with aggregates	Further evaluation is required to determine if a plant-specific aging management program is needed.	Yes, if concrete is not constructed as stated (See subsection 3.5.2.2.2.1.2)	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage cracking of the concrete (inaccessible areas) for all Group structures except Group 6. Group 6 structures are addressed under Item Number 3.5.1-50. Concrete fine and course aggregates used at LSCS conform to ASTM C33. Petrographic examinations of aggregates used in concrete were performed in accordance with ASTM C227 and other ASTM standards tests to prevent use of reactive aggregates. In addition concrete structures were constructed in accordance with ACI 318. Cracking associated with expansion due to reaction with aggregates has not been observed on accessible portions of the LSCS concrete structures. See subsection 3.5.2.2.2.1.2.
3.5.1-44	All Groups: concrete: all	Cracking and distortion due to increased stress levels from settlement	Chapter XI.S6, “Structures Monitoring” 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 a de-watering system is relied upon to control settlement (See subsection 3.5.2.2.2.1.3)	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage cracking and distortion of the reinforced concrete structural elements of LSCS structures founded on and exposed to the groundwater and soil environment. LSCS does not rely on a de-watering system to control settlement. See subsection 3.5.2.2.2.1.3

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-45	Groups 1-3, 5-9: concrete: foundation; subfoundation	Reduction in foundation strength, cracking due to differential settlement, erosion of porous concrete subfoundation	Chapter XI.S6, "Structures Monitoring" 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 a de-watering system is relied upon to control settlement (See subsection 3.5.2.2.2.1.3)	Not Applicable. LSCS structures do not utilize porous concrete subfoundations and do not rely on a de-watering system to control settlement. See subsection 3.5.2.2.2.1.3.
3.5.1-46	Groups 1-3, 5-9: concrete: foundation; subfoundation	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	Chapter XI.S6, "Structures Monitoring" 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 a de-watering system is relied upon to control settlement (See subsection 3.5.2.2.2.1.3)	Not Applicable. LSCS structures do not utilize porous concrete subfoundations and do not rely on a de-watering system to control settlement. See subsection 3.5.2.2.2.1.3.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-47	Groups 1-5, 7-9: concrete (inaccessible areas): exterior above- and below-grade; foundation	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Further evaluation is required to determine if a plant-specific aging management program is needed.	Yes, if leaching is observed in accessible areas that impact intended function (See subsection 3.5.2.2.2.1.4)	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage increase in porosity and permeability, loss of strength of the reinforced concrete (inaccessible areas): exterior above and below grade foundations for groups 1-3 and 5 structures which are subject to a the water-flowing environment. Group 7-9 structures are not applicable to LSCS. Although some leaching has been observed in the accessible areas it is not significant and did not impact its intended function. See subsection 3.5.2.2.2.1.4.
3.5.1-48	Groups 1-5: concrete: all	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	A plant-specific aging management program is to be evaluated.	Yes, if temperature limits are exceeded (See subsection 3.5.2.2.2.2)	Not Applicable. This aging effect is not applicable to LSCS whose bulk average bulk temperature does not exceed 135 ° F. In addition local temperatures in excess of 200 ° F have not been reported. See subsection 3.5.2.2.2.2.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-49	Groups 6 - concrete (inaccessible areas): exterior above- and below-grade; foundation; interior slab	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Further evaluation is required for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557)	Yes, for plants located in moderate to severe weathering conditions (See subsection 3.5.2.2.2.3.1)	Consistent with NUREG-1801. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage loss of material (spalling, scaling) and cracking Group 6 concrete structures for both accessible and inaccessible areas exposed to an air - outdoor environment. The LSCS structural concrete total air content varied according to mix design and aggregate size. However, the total air content was limited to not less than 3 percent and not more than 5 percent for above grade inaccessible areas exposed to the air-outdoor environment. Structural concrete in accessible areas for in scope structures has exhibited no signs of loss of material (spalling, scaling) and cracking due this mechanism. Although these conditions have not been observed, inspection for this aging effect is performed. See subsection 3.5.2.2.2.3.1.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-50	Groups 6: concrete (inaccessible areas): all	Cracking due to expansion from reaction with aggregates	Further evaluation is required to determine if a plant-specific aging management program is needed.	Yes, if concrete is not constructed as stated See subsection 3.5.2.2.2.3.2)	Consistent with NUREG-1801. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) and Structures Monitoring (B.2.1.34) program (which implements the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program) will be used to manage cracking of the Group 6 inaccessible reinforced concrete structural elements exposed to air - outdoor and groundwater/soil in the Cooling Lake and Lake Screen House. Concrete fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates used in concrete were performed in accordance with ASTM C227 and other ASTM standards tests to prevent use of reactive aggregates. In addition concrete structures were constructed in accordance with ACI 318. Cracking associated with expansion due to reaction with aggregates has not been observed on accessible portions of the LSCS concrete structures. The Structures Monitoring (B.2.1.34) program will require underground surfaces to be examined for signs of aging, including cracking due to expansion of aggregates when exposed during excavation. See subsection 3.5.2.2.2.3.2.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-51	Groups 6: concrete (inaccessible areas): exterior above- and below-grade; foundation; interior slab	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Further evaluation is required to determine if a plant-specific aging management program is needed.	Yes, if leaching is observed in accessible areas that impact intended function (See subsection 3.5.2.2.2.3.3)	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage increase in porosity and permeability, loss of strength of the Group 6 reinforced concrete exterior above- and below-grade foundation and interior slab inaccessible areas exposed to a water - flowing environment. Although some leaching has been observed in the accessible areas it is not significant and did not impact an intended function. See subsection 3.5.2.2.2.2.3.3.
3.5.1-52	Groups 7, 8 - steel components: tank liner	Cracking due to stress corrosion cracking; Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific (See subsection 3.5.2.2.2.4)	Not Applicable. The component, material, environment, aging effect and mechanism does not apply. LSCS does not have Group 7 or 8, steel components or steel tank liners exposed to standing water. See subsection 3.5.2.2.2.4.
3.5.1-53	Support members; welds; bolted connections; support anchorage to building structure	Cumulative fatigue damage due to fatigue (Only if CLB fatigue analysis exists)	Yes, TLAA	Yes, TLAA (See subsection 3.5.2.2.2.5)	Not Applicable. LSCS current licensing basis contains no fatigue analysis for component support members, welds, bolted connections, or support anchorage to the building structure. Therefore, a TLAA is not evaluated in accordance with 10 CFR 54.21(c) for these components. See subsection 3.5.2.2.2.5.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-54	All groups except 6: concrete (accessible areas): all	Cracking due to expansion from reaction with aggregates	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage cracking of Concrete in accessible areas for all structural Groups and also Group 6 structures, as GALL does not include any other comparable line item for this aging effect and mechanism for accessible areas of Group 6 structures.
3.5.1-55	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	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage reduction in concrete anchor capacity in building concrete locations of expansion and grouted anchors, and grout pads for support base plates.
3.5.1-56	Concrete: exterior above- and below-grade; foundation; interior slab	Loss of material due to abrasion; cavitation	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/US Army Corp of Engineers dam inspections and maintenance programs.	No	Consistent with NUREG-1801. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage loss of material for reinforced concrete exposed to flowing water.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-57	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	Chapter XI.S3, "ASME Section XI, Subsection IWF"	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWF (B.2.1.31) program will be used to manage loss of mechanical function of the carbon steel constant and variable load spring hangers; guides; and stops for ASME Class 1, 2, 3 and MC piping and components exposed to air - indoor uncontrolled.
3.5.1-58	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	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/US Army Corp of Engineers dam inspections and maintenance programs.	No	Consistent with NUREG-1801. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage loss of material or loss of form of the soil, rip-rap, sand, gravel earthen water-control structures (intake flume and submerged CSCS pond) exposed to water - flowing and water - standing environment.
3.5.1-59	Group 6: concrete (accessible areas): all	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/US Army Corp of Engineers dam inspections and maintenance programs.	No	Consistent with NUREG-1801. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage cracking, loss of bond, and loss of material (spalling, scaling) of concrete (accessible areas): CSCS outfall structure, shad net anchors, above-grade exterior, interior, equipment supports and foundations, and hatches/plugs exposed to air - indoor uncontrolled and air - outdoor environments.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-60	Group 6: concrete (accessible areas): exterior above- and below-grade; foundation	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/US Army Corp of Engineers dam inspections and maintenance programs.	No	Consistent with NUREG-1801. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage loss of material (spalling, scaling) and cracking of the concrete (accessible areas): CSCS outfall structure, shad net anchors, above-grade exterior and hatches/plugs exposed to the air - outdoor environment.
3.5.1-61	Group 6: concrete (accessible areas): exterior above- and below-grade; foundation; interior slab	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/US Army Corp of Engineers dam inspections and maintenance programs.	No	Consistent with NUREG-1801. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage increase in porosity and permeability, loss of strength of the concrete (accessible areas): CSCS outfall structure, shad net anchors, above-grade exterior, interior, and hatches/plugs exposed to the water - flowing environment.
3.5.1-62	Group 6: Wooden Piles; sheeting	Loss of material; change in material properties due to weathering, chemical degradation, and insect infestation repeated wetting and drying, fungal decay	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/US Army Corp of Engineers dam inspections and maintenance programs.	No	Not Applicable. The LSCS design does not utilize wooden piles or sheeting in group 6 structures.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-63	Groups 1-3, 5, 7-9: concrete (accessible areas): exterior above- and below-grade; foundation	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage increase in porosity and permeability, loss of strength for Groups 1-3, 5, 7-9: concrete in the accessible areas of exterior above grade and below grade concrete and foundation surfaces. Groups 7-9 structures are not applicable to LSCS.
3.5.1-64	Groups 1-3, 5, 7-9: concrete (accessible areas): exterior above- and below-grade; foundation	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of material (spalling, scaling) and cracking for groups 1-3, 5, 7-9: concrete in the accessible areas of exterior above and below-grade and foundations in the air-outdoor environment. Groups 7-9 structures are not applicable to LSCS.
3.5.1-65	Groups 1-3, 5, 7-9: concrete (inaccessible areas): below-grade exterior; foundation, Groups 1-3, 5, 7-9: concrete (accessible areas): below-grade exterior; foundation, Groups 6: concrete (inaccessible areas): all	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage cracking, loss of bond, and loss of material (spalling, scaling) for Groups 1-3, 5, 7-9: concrete in the accessible and inaccessible areas of below-grade exterior; foundation, and Group 6 and other concrete in the inaccessible areas exposed to the air-indoor uncontrolled, air-outdoor, and ground water –soil environments. Groups 7-9 structures are not applicable to LSCS.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-66	Groups 1-5, 7, 9: concrete (accessible areas): interior and above-grade exterior	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	Chapter XI.S6, “Structures Monitoring”	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage cracking, loss of bond, and loss of material (spalling, scaling) for Groups 1-5, 7, 9 concrete and reinforced concrete block in the accessible areas of interior and above-grade exterior surfaces subject to the air-indoor uncontrolled and air-outdoor environments. Groups 7-9 structures are not applicable to LSCS.
3.5.1-67	Groups 1-5, 7, 9: Concrete: interior; above-grade exterior, Groups 1-3, 5, 7-9 - concrete (inaccessible areas): below-grade exterior; foundation, Group 6: concrete (inaccessible areas): all	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage increase in porosity and permeability, cracking, loss of material (spalling, scaling)) for Groups 1-5, 7, 9 concrete interior and above-grade exterior, concrete in accessible and inaccessible areas; and in below-grade exterior; foundation, and Group 6 concrete for inaccessible areas subject to the groundwater and soil environments. Groups 7-9 structures are not applicable to LSCS.
3.5.1-68	High-strength structural bolting	Cracking due to stress corrosion cracking	Chapter XI.S3, “ASME Section XI, Subsection IWF”	No	Not Applicable. The component, material, environment, and aging effect/mechanism does not apply. LSCS does not use high strength structural bolts subject to SCC in this application.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-69	High-strength structural bolting	Cracking due to stress corrosion cracking	Chapter XI.S6, "Structures Monitoring“ Note: ASTM A 325, F 1852, and ASTM A 490 bolts used in civil structures have not shown to be prone to SCC. SCC potential need not be evaluated for these bolts.	No	Not Applicable. The component, material, environment, and aging effect/mechanism does not apply. LSCS does not use high strength structural bolts subject to SCC in structural connections. LSCS uses ASTM A325 or ASTM A490 bolts, which have not shown to be prone to SCC, therefore the SCC potential need not be evaluated for these bolts.
3.5.1-70	Masonry walls: all	Cracking due to restraint shrinkage, creep, and aggressive environment	Chapter XI.S5, “Masonry Walls”	No	Consistent with NUREG-1801. The Masonry Walls (B.2.1.33) program, which is implemented by the Structures Monitoring (B.2.1.34) program, will be used to manage cracking of concrete block masonry walls exposed to the air - indoor uncontrolled and air - outdoor environments.
3.5.1-71	Masonry walls: all	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Chapter XI.S5, “Masonry Walls"	No	Consistent with NUREG-1801. The Masonry Walls (B.2.1.33) program which is implemented by the Structures Monitoring (B.2.1.34) program will be used to manage cracking and loss of material (spalling, scaling) and cracking of the concrete block masonry walls exposed the air - outdoor environment.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-72	Seals; gasket; moisture barriers (caulking, flashing, and other sealants)	Loss of sealing due to deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Chapter XI.S6, “Structures Monitoring”	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of sealing due to deterioration of seals, gaskets, and moisture barriers (caulking, and flashing and other sealants) of structures exposed to various environments. Seals and gaskets for a tank foundation have been aligned to this Item Number based on material, environment, and aging effect. The Aboveground Metallic Tanks (B.2.1.18) program has been substituted to manage loss of sealing for this component in the air-outdoor environment. Seals and gaskets for the Primary Containment prestressing system grease cans have been aligned to this Item Number based on material, environment, and aging effect. The ASME Section XI, Subsection IWL (B.2.1.30) program has been substituted to manage loss of sealing for this component in the air-indoor uncontrolled environment
3.5.1-73	Service Level I coatings	Loss of coating integrity due to blistering, cracking, flaking, peeling, physical damage	Chapter XI.S8, "Protective Coating Monitoring and Maintenance"	No	Not Applicable. LSCS does utilize Service Level 1 coatings within the Primary Containment. However, the Service Level I coatings for the Primary Containment are addressed within Item Number 3.5.1-34 of this table.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-74	Sliding support bearings; sliding support surfaces	Loss of mechanical function due to corrosion, distortion, dirt, debris, overload, wear	Chapter XI.S6, “Structures Monitoring”	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of mechanical function of lubrite sliding support surfaces exposed to air-indoor uncontrolled in Structures and Component Supports.
3.5.1-75	Sliding surfaces	Loss of mechanical function due to corrosion, distortion, dirt, debris, overload, wear	Chapter XI.S3, “ASME Section XI, Subsection IWF”	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWF (B.2.1.31) program will be used to manage loss of mechanical function of lubrite sliding support surfaces exposed to air-indoor uncontrolled in Structures and Component Supports.
3.5.1-76	Sliding surfaces: radial beam seats in BWR drywell	Loss of mechanical function due to corrosion, distortion, dirt, overload, wear	Chapter XI.S6, “Structures Monitoring"	No	Not Applicable. There are no lubrite or similar sliding surfaces for BWR radial beam seats exposed to air- indoor uncontrolled in the drywell.
3.5.1-77	Steel components: all structural steel	Loss of material due to corrosion	Chapter XI.S6, “Structures Monitoring” 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.	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of material of steel components and structural steel exposed to air-indoor uncontrolled and air-outdoor for structures. Protective coatings are not relied upon to managing the effects of aging of steel components at LSCS.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-78	Steel components: fuel pool liner	Cracking due to stress corrosion cracking; Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," and Monitoring of the spent fuel pool water level in accordance with technical specifications and leakage from the leak chase channels.	No, unless leakages have been detected through the SFP liner that cannot be accounted for from the leak chase channels	Consistent with NUREG-1801 with exceptions. The Water Chemistry (B.2.1.2) program will be used to manage loss of material of the stainless steel spent fuel pool gates and fuel pool liner exposed to the treated water environment. Leakage from the spent fuel pool is fully contained in the leak chase drainage system and is routinely monitored for change in leakage. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.5.1-79	Steel components: piles	Loss of material due to corrosion	Chapter XI.S6, “Structures Monitoring”	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of material of the carbon steel sheet piling and penetration sleeves exposed to the groundwater and soil environments.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.5.1-80	Structural bolting	Loss of material due to general, pitting and crevice corrosion	Chapter XI.S6, “Structures Monitoring”	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of material of steel structural bolting exposed to the air - indoor uncontrolled environment. Bolting components in the Cranes, Hoists, and Refueling Equipment System have been aligned to this Item Number based on material, environment, and aging effect. The Inspection of Overhead Heavy and Light Load (Related to Refueling) Handling Systems (B.2.1.14) program has been substituted to manage the loss of material of the structural bolting for this system. Bolting components for the Primary Containment prestressing system grease caps at tendon anchorage has been aligned to this Item Number based on material, environment, and aging effect. The ASME Section XI, Subsection IWL (B.2.1.30) program has been substituted to manage the structural bolting for this system component exposed to the air - indoor uncontrolled environment.
3.5.1-81	Structural bolting	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S3, “ASME Section XI, Subsection IWF”	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWF (B.2.1.31) program will be used to manage the loss of material of structural bolting used in ASME Class I, 2, 3 and MC piping and component supports exposed to the air - indoor uncontrolled environment.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-82	Structural bolting	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S6, “Structures Monitoring”	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of material of the steel and galvanized steel bolting for blowout panels, concrete anchors, metal siding, miscellaneous steel (catwalks, stairs, handrails, ladders, platforms, etc.), panels, racks, frames, cabinets, and other enclosures, supports non-ASME piping and components exposed to the air - outdoor environment.
3.5.1-83	Structural bolting	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC/US Army Corp of Engineers dam inspections and maintenance programs.	No	Consistent with NUREG-1801. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage loss of material of the steel bolting, concrete anchors and embedments, sheet piling, and steel bar grill exposed to the water flowing, water standing, and air outdoor environments.
3.5.1-84	Structural bolting	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” and Chapter XI.S3, “ASME Section XI, Subsection IWF”	No	Not Applicable. LSCS does not use stainless steel bolting in MC treated water applications. LSCS does use Class I, 2, and 3 pipe and component support bolting in treated water which are addressed in Item Number 3.5.1-85.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-85	Structural bolting	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water, and Chapter XI.S3, "ASME Section XI, Subsection IWF"	No	Consistent with NUREG-1801 with exceptions. The ASME Section XI, Subsection IWF (B.2.1.31), and Water Chemistry (B.2.1.2) programs will be used to manage loss of material of the stainless steel bolting and supports for ASME Class 2 and 3 piping and components exposed to the treated water environment. Stainless steel bolting components in the Cranes, Hoists, and Refueling Equipment System have been aligned to this Item Number based on material, environment, and aging effect. The Inspection of Overhead Heavy and Light Load (Related to Refueling) Handling Systems (B.2.1.14) program has been substituted for the ASME Section XI, Subsection IWF (B.2.1.31) program, however Water Chemistry (B.2.1.2) will continued to also be used to manage the loss of material of the structural bolting for this system. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.5.1-86	Structural bolting	Loss of material due to pitting and crevice corrosion	Chapter XI.S3, "ASME Section XI, Subsection IWF"	No	Not Applicable. LSCS does not use steel or galvanized steel bolting for Class 1, 2 or 3 piping and component supports exposed to air-outdoor environment.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-87	Structural bolting	Loss of preload due to self-loosening	Chapter XI.S3, "ASME Section XI, Subsection IWF"	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWF (B.2.1.31) program will be used to manage loss of preload of the structural bolting used for ASME Class 1, 2, 3, and MC piping and component supports exposed to air - indoor uncontrolled and treated water environments.
3.5.1-88	Structural bolting	Loss of preload due to self-loosening	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of preload structural bolting exposed to any environment. Bolting components in the Cranes, Hoists, and Refueling Equipment System have been aligned to this Item Number based on material, environment, and aging effect. The Inspection of Overhead Heavy and Light Load (Related to Refueling) Handling Systems (B.2.1.14) program has been substituted to manage the loss of preload of the structural bolting for this system. Bolting components for the Primary Containment prestressing system grease caps at tendon anchorage has been aligned to this Item Number based on material, environment, and aging effect. The ASME Section XI, Subsection IWL (B.2.1.30) program has been substituted to manage the structural bolting for this system component exposed to the air - indoor uncontrolled environment.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-89	PWRs Only				
3.5.1-90	Support members; welds; bolted connections; support anchorage to building structure	Loss of material due to general (steel only), pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water, and Chapter XI.S3, "ASME Section XI, Subsection IWF"	No	Consistent with NUREG-1801 with exceptions. The ASME Section XI, Subsection IWF (B.2.1.31), and Water Chemistry (B.2.1.2) program will be used to manage loss of material of the carbon steel support members, welds, bolted connections and support anchorage for ASME Class 2 and 3 piping and component support exposed to a treated water environment. An exception applies to the NUREG-1801 recommendations for Water Chemistry (B.2.1.2) program implementation.
3.5.1-91	Support members; welds; bolted connections; support anchorage to building structure	Loss of material due to general and pitting corrosion	Chapter XI.S3, "ASME Section XI, Subsection IWF"	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWF (B.2.1.31) program will be used to manage loss of material of the carbon steel support members, welds, bolted connections, and support anchorage for ASME Class 1, 2, 3, MC components exposed to the air - indoor uncontrolled environment.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-92	Support members; welds; bolted connections; support anchorage to building structure	Loss of material due to general and pitting corrosion	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of material of the carbon steel support members and miscellaneous steel, welds, bolted connections, and support anchorage to building structures exposed to the air - indoor uncontrolled and air - outdoor environments.
3.5.1-93	Support members; welds; bolted connections; support anchorage to building structure	Loss of material due to pitting and crevice corrosion	Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.34) program will be used to manage loss of material of the aluminum, galvanized steel, stainless steel, and stainless steel support members, welds, bolted connections, support anchorage and other structural component parts exposed to the air - outdoor environment. Shad net components from the Essential Cooling Water System have been aligned to this Item Number based on material, environment, and aging effect. The Open-Cycle Cooling Water System (B.2.1.12) program has been substituted to manage those portions of the shad net for this system component in the air-outdoor environment.
3.5.1-94	Vibration isolation elements	Reduction or loss of isolation function due to radiation hardening, temperature, humidity, sustained vibratory loading	Chapter XI.S3, "ASME Section XI, Subsection IWF"	No	Not Applicable. LSCS does not use elastomeric vibration isolation supports for the subject components exposed to the air-indoor uncontrolled or air-outdoor environments.

Table 3.5.1 Summary of Aging Management Evaluations for the Structures and Component Supports					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.5.1-95	Aluminum, galvanized steel and stainless steel Support members; welds; bolted connections; support anchorage to building structure exposed to Air – indoor, uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. LSCS aging management review concluded that aluminum, galvanized steel, and stainless steel components exposed to an air-indoor uncontrolled environment have no aging effects requiring aging management. Components from the Cranes, Hoists, and Refueling Equipment System have been aligned to this Item Number based on material, environment and aging effect for the aluminum alloy system components exposed to the air – indoor uncontrolled environment.

Table 3.5.2-1
Auxiliary Building
Summary of Aging Management Evaluation

Table 3.5.2-1 Auxiliary Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Blowout Panels	Pressure Relief	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	C
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Curbs	Direct Flow	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-24	3.5.1-63	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Missile Barrier	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Structural Pressure Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (accessible areas)	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Missile Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Missile Barrier	Reinforced concrete	Groundwater/Soil	Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Pressure Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Missile Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Missile Barrier	Reinforced concrete	Groundwater/Soil	Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Structural Support	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Interior	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Equipment Supports and Foundations	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
Hatches/Plugs	Flood Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Missile Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Masonry Walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Shielding	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Structural Support	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Metal Components (Including Control Room Ceiling)	Structural Support	Aluminum	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
		Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
Metal Decking	Structural Support	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
Pipe Whip Restraints	Pipe Whip Restraint	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
Steel Components: Structural Steel	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
Steel Elements (Ventilation Stack)	Gaseous Release Path	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
Steel Elements: Liner, Liner Anchors, Integral Attachments (accessible areas - Sump)	Water retaining boundary	Stainless Steel	Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Condensation	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C

Table 3.5.2-1 Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Liner, Liner Anchors, Integral Attachments (accessible areas - Sump)	Water retaining boundary	Stainless Steel	Waste Water	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C

Table 3.5.2-1 Auxiliary Building (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Masonry walls are inspected as a part of the Structures Monitoring (B.2.1.34) program, which includes the ten attributes of the NUREG-1801 Masonry Walls (B.2.1.33) program.

Table 3.5.2-2

Component Supports Commodity Group

Summary of Aging Management Evaluation

Table 3.5.2-2 Component Supports Commodity Group

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for ASME Class 1 piping and components (Building concrete at locations of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Grout	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B1.1.TP-42	3.5.1-55	A
		Reinforced concrete	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B1.1.TP-42	3.5.1-55	A
Supports for ASME Class 1 piping and components (Constant and variable load spring hangers; guides; stops)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.T-24	3.5.1-91	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.T-28	3.5.1-57	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.TP-226	3.5.1-81	A
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.TP-229	3.5.1-87	A
		Lubrite	Air - Indoor Uncontrolled	Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.TP-45	3.5.1-75	C

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for ASME Class 1 piping and components (Constant and variable load spring hangers; guides; stops)	Structural Support	Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B1.1.TP-8	3.5.1-95	A
Supports for ASME Class 1 piping and components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.T-24	3.5.1-91	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.TP-226	3.5.1-81	A
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.TP-229	3.5.1-87	A
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B1.1.TP-8	3.5.1-95	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.TP-229	3.5.1-87	A
				None	None	III.B1.1.TP-8	3.5.1-95	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for ASME Class 2 and 3 piping and components (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Grout	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B1.2.TP-42	3.5.1-55	A
		Reinforced concrete	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B1.2.TP-42	3.5.1-55	A
Supports for ASME Class 2 and 3 piping and components (Constant and variable load spring hangers; guides; stops)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.T-24	3.5.1-91	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.T-28	3.5.1-57	A
		Lubrite	Air - Indoor Uncontrolled	Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.TP-45	3.5.1-75	C
Supports for ASME Class 2 and 3 piping and components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.T-24	3.5.1-91	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.TP-10	3.5.1-90	C

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for ASME Class 2 and 3 piping and components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon Steel	Treated Water	Loss of Material	Water Chemistry (B.2.1.2)	III.B1.1.TP-10	3.5.1-90	D
		Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.TP-226	3.5.1-81	A
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.TP-229	3.5.1-87	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.TP-10	3.5.1-90	A
					Water Chemistry (B.2.1.2)	III.B1.1.TP-10	3.5.1-90	B
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.TP-229	3.5.1-87	A
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B1.2.TP-8	3.5.1-95	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.TP-232	3.5.1-85	C
					Water Chemistry (B.2.1.2)	III.B1.2.TP-232	3.5.1-85	D
		Stainless Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.TP-229	3.5.1-87	A
				None	None	III.B1.2.TP-8	3.5.1-95	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.TP-232	3.5.1-85	A
					Water Chemistry (B.2.1.2)	III.B1.2.TP-232	3.5.1-85	B
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.2.TP-229	3.5.1-87	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for ASME Class MC components (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B1.3.TP-42	3.5.1-55	A
Supports for ASME Class MC components (Constant and variable load spring hangers; guides; stops)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.3.T-24	3.5.1-91	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.3.T-28	3.5.1-57	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.3.TP-226	3.5.1-81	A
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.3.TP-229	3.5.1-87	A
		Lubrite	Air - Indoor Uncontrolled	Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.3.TP-45	3.5.1-75	C
Supports for ASME Class MC components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.3.T-24	3.5.1-91	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for ASME Class MC components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.3.TP-226	3.5.1-81	A
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.3.TP-229	3.5.1-87	A
Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-43	3.5.1-92	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B2.TP-261	3.5.1-88	A
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-43	3.5.1-92	A
		Galvanized Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.34)	III.B2.TP-261	3.5.1-88	A
				None	None	III.B2.TP-8	3.5.1-95	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Galvanized Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B2.TP-261	3.5.1-88	A
		Lubrite	Air - Indoor Uncontrolled	Loss of Mechanical Function	Structures Monitoring (B.2.1.34)	III.B2.TP-46	3.5.1-74	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.34)	III.B2.TP-261	3.5.1-88	A
				None	None	III.B2.TP-8	3.5.1-95	A
Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Concrete	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B2.TP-42	3.5.1-55	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Concrete	Air - Outdoor	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B2.TP-42	3.5.1-55	A
		Grout	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B2.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B2.TP-42	3.5.1-55	A
Supports for Emergency Diesel Generator, HVAC System Components, and Other Misc. Mechanical Equipment (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Concrete	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B4.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B4.TP-42	3.5.1-55	A
		Grout	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B4.TP-42	3.5.1-55	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for Emergency Diesel Generator, HVAC System Components, and Other Misc. Mechanical Equipment (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Grout	Air - Outdoor	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B4.TP-42	3.5.1-55	A
Supports for Emergency Diesel Generator, HVAC System Components, and Other Misc. Mechanical Equipment (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-43	3.5.1-92	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-43	3.5.1-92	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B4.TP-261	3.5.1-88	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for Emergency Diesel Generator, HVAC System Components, and Other Misc. Mechanical Equipment (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B4.TP-261	3.5.1-88	A
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-6	3.5.1-93	A
		Galvanized Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.34)	III.B4.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B4.TP-261	3.5.1-88	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for Platforms, Jet Impingement Shields, Masonry Walls, and Other Misc. Structures (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Concrete	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B5.TP-42	3.5.1-55	A
		Grout	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B5.TP-42	3.5.1-55	A
Supports for Platforms, Jet Impingement Shields, Masonry Walls, and Other Miscellaneous Structures (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B5.TP-43	3.5.1-92	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B5.TP-43	3.5.1-92	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B5.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B5.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B5.TP-274	3.5.1-82	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for Platforms, Jet Impingement Shields, Masonry Walls, and Other Miscellaneous Structures (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Outdoor	Loss of Preload	Structures Monitoring (B.2.1.34)	III.B5.TP-261	3.5.1-88	A
Supports for Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (Building concrete at location of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Concrete	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B3.TP-42	3.5.1-55	A
		Grout	Air - Indoor Uncontrolled	Reduction in Concrete Anchor Capacity	Structures Monitoring (B.2.1.34)	III.B3.TP-42	3.5.1-55	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B3.TP-43	3.5.1-92	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B3.TP-43	3.5.1-92	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B3.TP-261	3.5.1-88	A
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-6	3.5.1-93	A
		Galvanized Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.34)	III.B3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B3.TP-261	3.5.1-88	A

Table 3.5.2-2 Component Supports Commodity Group (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

Table 3.5.2-3

Cooling Lake

Summary of Aging Management Evaluation

Table 3.5.2-3 Cooling Lake

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete Embedments	Structural Support	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: (CSCS Outfall Structure)	Direct Flow	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	C
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
			Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A6.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-220	3.5.1-50	C
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A

Table 3.5.2-3 Cooling Lake (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: (CSCS Outfall Structure)	Direct Flow	Reinforced concrete	Water - Flowing	Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-220	3.5.1-50	C
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	C
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
			Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A6.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-220	3.5.1-50	C
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-220	3.5.1-50	C

Table 3.5.2-3 Cooling Lake (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: (CSCS Outfall Structure)	Structural Support	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A
Concrete: Shad Net Anchors	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	C
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
			Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A6.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-220	3.5.1-50	C
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A

Table 3.5.2-3 Cooling Lake (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Earthen Water-Control Structures (Intake Flume and Submerged CSCS Pond)	Direct Flow	Soil, Rip-Rap, Sand, Gravel	Air - Outdoor	Loss of Material or Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)			G, 1
			Water - Flowing	Loss of Material or Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.T-22	3.5.1-58	A
			Water - Standing	Loss of Material or Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.T-22	3.5.1-58	A
	Water retaining boundary	Soil, Rip-Rap, Sand, Gravel	Air - Outdoor	Loss of Material or Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)			G,1
			Water - Flowing	Loss of Material or Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.T-22	3.5.1-58	A
			Water - Standing	Loss of Material or Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.T-22	3.5.1-58	A
Hatches/Plugs	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-220	3.5.1-50	C

Table 3.5.2-3 Cooling Lake (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	Shelter, Protection	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-220	3.5.1-50	C
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A

Table 3.5.2-3 Cooling Lake (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The aging effect for this component, material, and environment combination is not in NUREG-1801, however the RG 1.127 Inspection of Water Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage this component's aging effect.

Table 3.5.2-4
Diesel Generator Building
Summary of Aging Management Evaluation

Table 3.5.2-4 Diesel Generator Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
		Stainless Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-6	3.5.1-93	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Curbs	Direct Flow	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-24	3.5.1-63	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: (Exhaust Enclosure) Above-grade exterior	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: (Exhaust Enclosure) Above-grade exterior	Structural Support	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Interior	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Equipment Supports and Foundations	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Hatches/Plugs	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Masonry Walls: Above-grade Exterior	Missile Barrier	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Masonry Walls: Above-grade Exterior	Missile Barrier	Concrete Block	Air - Outdoor	Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
	Shelter, Protection	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
	Structural Support	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
Masonry Walls: Interior	Missile Barrier	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Structural Support	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
Metal Decking	Structural Support	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
Metal Siding	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C

Table 3.5.2-4 Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Metal Siding	Shelter, Protection	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	C
Steel Components: Structural Steel	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
Steel Elements: Liner, Liner Anchors, Integral Attachments (Sump Liner)	Water retaining boundary	Stainless Steel	Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Condensation	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C
			Waste Water	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C

Table 3.5.2-4 Diesel Generator Building (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Masonry walls are inspected as a part of the Structures Monitoring (B.2.1.34) program, which includes the ten attributes of the NUREG-1801 Masonry Walls (B.2.1.33) program.

Table 3.5.2-5

Lake Screen House

Summary of Aging Management Evaluation

Table 3.5.2-5 Lake Screen House

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A6.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A6.TP-261	3.5.1-88	A
		Galvanized Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.34)	III.A6.TP-261	3.5.1-88	A
			Water - Flowing	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-221	3.5.1-83	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A6.TP-261	3.5.1-88	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A6.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A6.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-221	3.5.1-83	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A6.TP-261	3.5.1-88	A
			Concrete	None	None	VII.J.AP-282	3.3.1-112	C
		Stainless Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.34)	III.A6.TP-261	3.5.1-88	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete Anchors	Structural Support	Stainless Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A6.TP-261	3.5.1-88	A
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Raw Water	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	VII.H2.AP-55	3.3.1-41	E, 1
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A6.TP-261	3.5.1-88	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
			Water - Flowing	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-221	3.5.1-83	C
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A
	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-110	3.5.1-49	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Missile Barrier	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-110	3.5.1-49	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-110	3.5.1-49	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-110	3.5.1-49	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
	Missile Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
	Water retaining boundary	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A6.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A6.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A6.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Structural Support	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
	Water retaining boundary	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A6.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-107	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A6.TP-109	3.5.1-51	A
Concrete: Interior	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Water - Flowing	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)			H, 2
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior	Missile Barrier	Reinforced concrete	Water - Flowing	Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.T-20	3.5.1-56	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Water - Flowing	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)			H, 2
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A
				Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.T-20	3.5.1-56	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Water - Flowing	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)			H, 2

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior	Structural Support	Reinforced concrete	Water - Flowing	Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-37	3.5.1-61	A
				Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.T-20	3.5.1-56	A
Equipment Supports and Foundations	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Hatches/Plugs	Missile Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	Missile Barrier	Concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	Structural Support	Concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-38	3.5.1-59	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-36	3.5.1-60	A
Masonry Walls: Above-grade Exterior	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A6.T-12	3.5.1-70	A, 3
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A6.T-12	3.5.1-70	A, 3
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 3
	Structural Support	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A6.T-12	3.5.1-70	A, 3
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A6.T-12	3.5.1-70	A, 3
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 3
Masonry Walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Masonry Walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking	Masonry Walls (B.2.1.33)	III.A6.T-12	3.5.1-70	A, 3
	Structural Support	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A6.T-12	3.5.1-70	A, 3
Metal Siding	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
Piles (Sheet Piling-North Flume Wall)	Flood Barrier	Carbon Steel	Air - Outdoor	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-221	3.5.1-83	C
			Groundwater/Soil	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-219	3.5.1-79	A
			Water - Standing	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-221	3.5.1-83	C
	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-221	3.5.1-83	C
			Groundwater/Soil	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-219	3.5.1-79	A
			Water - Standing	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-221	3.5.1-83	C
Precast Panel (Roof Slab)	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C

Table 3.5.2-5 Lake Screen House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Precast Panel (Roof Slab)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A6.TP-220	3.5.1-50	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-110	3.5.1-49	A
Steel Components: Structural Steel	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
Steel Elements (Bar Grill)	Filter	Galvanized Steel	Air - Outdoor	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-221	3.5.1-83	C
			Water - Flowing	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)	III.A6.TP-221	3.5.1-83	C

Table 3.5.2-5 Lake Screen House (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

2. The aging effect for this component, material, and environment combination is not in NUREG-1801, however, the RG 1.127 Inspection of Water Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage this component's aging effect.

3. Masonry walls are inspected as a part of the Structures Monitoring (B.2.1.34) program, which includes the ten attributes of the NUREG-1801 Masonry Walls (B.2.1.33) program.

Table 3.5.2-6
Offgas Building
Summary of Aging Management Evaluation

Table 3.5.2-6 Offgas Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Curbs	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A

Table 3.5.2-6 Offgas Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Shielding	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-6 Offgas Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Shielding	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A

Table 3.5.2-6 Offgas Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Missile Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-6 Offgas Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Shelter, Protection	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A

Table 3.5.2-6 Offgas Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Interior	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-6 Offgas Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Equipment Supports and Foundations	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Hatches/Plugs	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-6 Offgas Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Masonry Walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Shielding	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Structural Support	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
Metal Decking	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
	Structural Support	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
Metal Siding	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
Steel Components: Structural Steel	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A

Table 3.5.2-6 Offgas Building (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Masonry walls are inspected as a part of the Structures Monitoring (B.2.1.34) program, which includes the ten attributes of the NUREG-1801 Masonry Walls (B.2.1.33) program.

Table 3.5.2-7
Primary Containment
Summary of Aging Management Evaluation

Table 3.5.2-7 Primary Containment

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Containment Closure)	Structural Pressure Barrier	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-148	3.5.1-31	A
				Loss of Preload	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-150	3.5.1-30	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-150	3.5.1-30	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
				Loss of Preload	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-150	3.5.1-30	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-150	3.5.1-30	A
	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-148	3.5.1-31	A
				Loss of Preload	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-150	3.5.1-30	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-150	3.5.1-30	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Containment Closure)	Structural Support	Stainless Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-150	3.5.1-30	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-150	3.5.1-30	A
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A4.TP-261	3.5.1-88	A
Bolting (Vacuum Relief Line Pipe Flanges)	Structural Pressure Barrier	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-148	3.5.1-31	A
				Loss of Preload	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-150	3.5.1-30	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-150	3.5.1-30	A
	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-148	3.5.1-31	A
				Loss of Preload	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-150	3.5.1-30	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-150	3.5.1-30	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A4.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Embedments	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete Embedments	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
	Water retaining boundary	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
Concrete: Containment Wall (accessible areas - includes Buttresses)	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Containment Wall (accessible areas - includes Buttresses)	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
Concrete: Containment Wall (inaccessible areas - includes Buttresses)	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	II.B2.2.CP-80	3.5.1-22	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-99	3.5.1-12	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	II.B2.2.CP-80	3.5.1-22	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-99	3.5.1-12	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Containment Wall (inaccessible areas - includes Buttresses)	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	II.B2.2.CP-80	3.5.1-22	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-99	3.5.1-12	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	II.B2.2.CP-80	3.5.1-22	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-99	3.5.1-12	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	II.B2.2.CP-80	3.5.1-22	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-99	3.5.1-12	A
Concrete: Foundation, Subfoundation, Basemat (accessible areas - Tendon Access Tunnel Ceiling)	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-54	3.5.1-20	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation, Basemat (accessible areas - Tendon Access Tunnel Ceiling)	Structural Pressure Barrier	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-54	3.5.1-20	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-54	3.5.1-20	A
Concrete: Foundation, Subfoundation, Basemat (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	II.B2.2.CP-105	3.5.1-1	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	II.B2.2.CP-99	3.5.1-12	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	II.A1.CP-100	3.5.1-24	C
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	II.B2.2.CP-110	3.5.1-14	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	II.B2.2.CP-105	3.5.1-1	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation, Basemat (inaccessible areas)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	II.B2.2.CP-99	3.5.1-12	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	II.A1.CP-100	3.5.1-24	C
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	II.B2.2.CP-110	3.5.1-14	A
	Structural Pressure Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	II.B2.2.CP-105	3.5.1-1	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	II.B2.2.CP-99	3.5.1-12	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	II.A1.CP-100	3.5.1-24	C
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	II.B2.2.CP-110	3.5.1-14	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	II.B2.2.CP-105	3.5.1-1	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation, Basemat (inaccessible areas)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking	Structures Monitoring (B.2.1.34)	II.B2.2.CP-99	3.5.1-12	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	II.A1.CP-100	3.5.1-24	C
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	II.B2.2.CP-110	3.5.1-14	A
Concrete: Interior (Drywell Floor and Cavity Floor)	Direct Flow	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-54	3.5.1-20	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-54	3.5.1-20	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior (Drywell Floor and Cavity Floor)	Structural Support	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-54	3.5.1-20	A
Concrete: Interior (Pedestal)	Direct Flow	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
			Encased in Steel	None	None			G, 1
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
			Encased in Steel	None	None			G, 1
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	A
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
			Encased in Steel	None	None			G, 1
Concrete: Interior (Suppression Pool Columns)	Structural Support	Reinforced concrete	Encased in Steel	None	None			G, 1
Concrete: Reactor Cavity Contiguous Fuel Pool Walls with Tendons	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	C
				Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-79	3.5.1-21	C

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Reactor Cavity Contiguous Fuel Pool Walls with Tendons	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.CP-59	3.5.1-19	A
Doors (Reactor Shield Wall Doors)	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C
Downcomer Jet Deflectors	Direct Flow	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-117	3.5.1-31	C
	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-117	3.5.1-31	C
Electrical Penetration Assemblies (includes Penetration Sleeves and Closure Plates)	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-36	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-36	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-41	3.5.1-33	A
		Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Electrical Penetration Assemblies (includes Penetration Sleeves and Closure Plates)	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-36	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-36	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-41	3.5.1-33	A
		Glass	Air - Indoor Uncontrolled	None	None	VII.J.AP-14	3.3.1-117	C
		Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Hatches/Plugs	Missile Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.C-16	3.5.1-28	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.C-16	3.5.1-28	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.C-16	3.5.1-28	C

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.C-16	3.5.1-28	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.C-16	3.5.1-28	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.C-16	3.5.1-28	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
Mechanical Penetrations (includes Penetration Sleeves, Flued Heads, and Closure Plates for Pipe and Instrument Penetrations)	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-36	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-36	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Carbon Steel; dissimilar metal welds	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
		Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Mechanical Penetrations (includes Penetration Sleeves, Flued Heads, and Closure Plates for Pipe and Instrument Penetrations)	Shelter, Protection	Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-36	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-36	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Carbon Steel; dissimilar metal welds	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
		Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Mechanical Penetrations (includes Penetration Sleeves, Flued Heads, and Closure Plates for Pipe and Instrument Penetrations)	Structural Pressure Barrier	Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-36	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-36	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Carbon Steel; dissimilar metal welds	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
		Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Mechanical Penetrations (includes Penetration Sleeves, Flued Heads, and Closure Plates for Pipe and Instrument Penetrations)	Structural Support	Stainless Steel	Treated Water	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 2
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	C
Metal Components (Permanent Drywell Shielding)	Shielding	Lead	Air - Indoor Uncontrolled	None	None			J, 3
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C
		Fiberglass	Air - Indoor Uncontrolled	Change in Material Properties	Structures Monitoring (B.2.1.34)			J, 3
Penetration Sleeves: Drywell Floor (including Closure Rings, Plates, and Caps)	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-117	3.5.1-31	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-117	3.5.1-31	C
		Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration Sleeves: Drywell Floor (including Closure Rings, Plates, and Caps)	Structural Pressure Barrier	Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-117	3.5.1-31	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-117	3.5.1-31	C
		Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
Personnel Airlock, Equipment Hatch: CRD Hatch	Missile Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.C-16	3.5.1-28	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.C-16	3.5.1-28	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Personnel Airlock, Equipment Hatch: CRD Hatch	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.C-16	3.5.1-28	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.C-16	3.5.1-28	A
		Glass	Air - Indoor Uncontrolled	None	None	VIII.I.SP-9	3.4.1-55	A
	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.C-16	3.5.1-28	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.C-16	3.5.1-28	A
		Glass	Air - Indoor Uncontrolled	None	None	VIII.I.SP-9	3.4.1-55	A
Personnel Airlock, Equipment Hatch: Locks, Hinges, and Closure Mechanisms	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Leaktightness	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-39	3.5.1-29	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-39	3.5.1-29	A
	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Leaktightness	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-39	3.5.1-29	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B4.CP-39	3.5.1-29	A
Pipe Whip Restraints and Jet Impingement Shields	Pipe Whip Restraint	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Prestressing System: Anchorage Components	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.C-10	3.5.1-32	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Prestressing System: Anchorage Components	Structural Support	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Prestressing System: Grease Cap at Tendon Anchorage	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.C-10	3.5.1-32	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWL (B.2.1.30)	III.A2.TP-248	3.5.1-80	E, 4
				Loss of Preload	ASME Section XI, Subsection IWL (B.2.1.30)	III.A2.TP-261	3.5.1-88	E, 4
		Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	ASME Section XI, Subsection IWL (B.2.1.30)	III.A6.TP-7	3.5.1-72	E, 4
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Prestressing System: Tendons	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWL (B.2.1.30)	II.B2.2.C-10	3.5.1-32	A
				Loss of Prestress	TLAA	II.B2.2.C-11	3.5.1-8	A
Seals and Gaskets	Structural Pressure Barrier	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	10 CFR Part 50, Appendix J (B.2.1.32)	II.B4.CP-41	3.5.1-33	A
Service Level I Coatings (Containment Boundary)	Maintain Adhesion	Coatings	Air - Indoor Uncontrolled	Loss of Coating Integrity	Protective Coating Monitoring and Maintenance Program (B.2.1.36)	II.B4.CP-152	3.5.1-34	A
			Treated Water	Loss of Coating Integrity	Protective Coating Monitoring and Maintenance Program (B.2.1.36)			G, 6
Service Level I Coatings (Internal Structures)	Maintain Adhesion	Coatings	Air - Indoor Uncontrolled	Loss of Coating Integrity	Protective Coating Monitoring and Maintenance Program (B.2.1.36)	II.B4.CP-152	3.5.1-34	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Service Level I Coatings (Internal Structures)	Maintain Adhesion	Coatings	Treated Water	Loss of Coating Integrity	Protective Coating Monitoring and Maintenance Program (B.2.1.36)			G, 6
Sliding Surfaces (Support)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	A
				Loss of Mechanical Function	Structures Monitoring (B.2.1.34)			F, 9
Steel Components: (Reactor Shield Wall)	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C
	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C
		Concrete	Encased in Steel	None	None			G, 1
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C
Steel Components: (Reactor Stabilizer Bracket Assembly)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.T-24	3.5.1-91	C
Steel Components: Reactor Stabilizer Structure (Stabilizer Truss)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.T-24	3.5.1-91	C
Steel Components: Structural Steel	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	A
Steel Elements: (Grating)	Structural Support	Aluminum	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
		Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C
Steel Elements: (Refueling Bellows Assembly)	Flood Barrier	Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C
				None	None	III.B5.TP-8	3.5.1-95	C, 7

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: (Refueling Bellows Assembly)	Shelter, Protection	Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C
				None	None	III.B5.TP-8	3.5.1-95	C, 7
	Structural Support	Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C
				None	None	III.B5.TP-8	3.5.1-95	C, 7
	Water retaining boundary	Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C
				None	None	III.B5.TP-8	3.5.1-95	C, 7
Steel Elements: Downcomer Bracing (Stiffeners)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-117	3.5.1-31	C
			Treated Water	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-117	3.5.1-31	C
Steel Elements: Downcomers	Direct Flow	Stainless Steel	Air - Indoor Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 2
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
Steel Elements: Drywell Floor and Cavity Floor Liner, Liner Anchors, Integral Attachments	Direct Flow	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Drywell Floor and Cavity Floor Liner, Liner Anchors, Integral Attachments	Structural Pressure Barrier	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
Steel Elements: Drywell Head	Missile Barrier	Carbon Steel	Air - Indoor Uncontrolled	Fretting or Lockup	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-23	3.5.1-36	A
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Fretting or Lockup	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-23	3.5.1-36	A
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Fretting or Lockup	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-23	3.5.1-36	A
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
Steel Elements: Drywell Liner, Liner Anchors, Integral Attachments (accessible areas)	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Drywell Liner, Liner Anchors, Integral Attachments (accessible areas)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Steel Elements: Drywell Liner, Liner Anchors, Integral Attachments (inaccessible areas)	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-63	3.5.1-5	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-63	3.5.1-5	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-63	3.5.1-5	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-63	3.5.1-5	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Steel Elements: Liner for Concrete Columns, Liner Anchors, Integral Attachments	Shelter, Protection	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	II.B2.2.C-49	3.5.1-37	E, 8
			Treated Water	Loss of Material	Structures Monitoring (B.2.1.34)	II.B2.2.C-49	3.5.1-37	E, 8

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Liner, Liner Anchors, Integral Attachments (Sump)	Direct Flow	Stainless Steel	Condensation	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C
			Waste Water	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C
	Water retaining boundary	Stainless Steel	Condensation	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C
			Waste Water	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C
Steel Elements: Pedestal Liner, Liner Anchors, and Integral Attachments	Direct Flow	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
			Treated Water	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
	Shelter, Protection	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5
	Structural Pressure Barrier	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	E, 5

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Ring Girder Adapter (Unit 1 Vessel Skirt)	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.31)	III.B1.1.T-24	3.5.1-91	A
Steel Elements: Ring Girder Assembly (includes Cone Skirt)	Flood Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Ring Girder Assembly (includes Cone Skirt)	Water retaining boundary	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
Steel Elements: Seal Plate	Flood Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C, 7
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C, 7
	Water retaining boundary	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A4.TP-302	3.5.1-77	C, 7
Steel Elements: Suppression Chamber Liner, Liner Anchors, Integral Attachments (accessible areas)	Structural Pressure Barrier	Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
	Structural Support	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Suppression Chamber Liner, Liner Anchors, Integral Attachments (accessible areas)	Structural Support	Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
	Water retaining boundary	Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
Steel Elements: Suppression Chamber Liner, Liner Anchors, Integral Attachments (inaccessible areas)	Structural Pressure Barrier	Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Suppression Chamber Liner, Liner Anchors, Integral Attachments (inaccessible areas)	Structural Pressure Barrier	Stainless Steel	Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
	Structural Support	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
	Water retaining boundary	Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
Steel Elements: Vacuum Breaker Valves, Isolation Valves, and Piping	Pressure Relief	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A

Table 3.5.2-7 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Vacuum Breaker Valves, Isolation Valves, and Piping	Pressure Relief	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.CP-46	3.5.1-35	A
		Stainless Steel	Air - Indoor Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.32)	II.B2.2.C-49	3.5.1-37	A
					ASME Section XI, Subsection IWE (B.2.1.29)	II.B2.2.C-49	3.5.1-37	A
Tunnel (Tendon Access Walls and Floor)	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-24	3.5.1-63	A

Table 3.5.2-7 Primary Containment (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The environment encased in steel protects concrete from other environments that promote age-related degradation.
2. The TLAA designation in the Aging Management Programs column indicates fatigue of this component is evaluated in Sections 4.6.
3. Lead shielding in an air-indoor uncontrolled environment has no applicable aging effects requiring management. However, the fiberglass blanket covers will be inspected by the Structures Monitoring (B.2.1.34) program for rips and tears.
4. The ASME Section XI, Subsection IWL (B.2.1.30) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination for the grease caps used for the tendons.
5. ASME Section XI, Subsection IWE (B.2.1.29) program is the applicable aging management program for this component. 10 CFR 50 Appendix J pressure testing is not applicable to the drywell floor liner, cavity slab liner, drywell floor penetrations, downcomers, and pedestal liner.
6. The Protective Coating Monitoring and Maintenance Program (B.2.1.36) is the applicable aging management program for this component, material, environment, and aging effect combination.

Table 3.5.2-7 Primary Containment (Continued)

Plant Specific Notes: (continued)

7. The normal environment for this component is Air-Indoor, Uncontrolled. The treated water environment exists only on a short term basis during refueling outages, and therefore it is not addressed separately for aging management.

8. The Structures Monitoring (B.2.1.34) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination for the non-pressure boundary liners for the concrete columns.

9. The sliding supports and bearings for drywell steel beams do not use Lubrite or similar material but are instead steel to steel connections.

Table 3.5.2-8
Radwaste Building
Summary of Aging Management Evaluation

Table 3.5.2-8 Radwaste Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
		Galvanized Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Curbs	Direct Flow	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-24	3.5.1-63	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-8 Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Shielding	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-8 Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Shielding	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-8 Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Water retaining boundary	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-8 Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Water retaining boundary	Reinforced concrete	Groundwater/Soil	Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-8 Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Water retaining boundary	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-8 Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Water retaining boundary	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Interior	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Water retaining boundary	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Equipment Supports and Foundations	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Hatches/Plugs	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-8 Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Masonry Walls: Above-grade Exterior	Shelter, Protection	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
	Shielding	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1

Table 3.5.2-8 Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Masonry Walls: Above-grade Exterior	Structural Support	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
Masonry Walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Shielding	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Structural Support	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
Steel Components: Structural Steel	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
Steel Elements: Liner, Liner Anchors, Integral Attachments (Sump or Pit Liners)	Water retaining boundary	Stainless Steel	Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Condensation	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C
			Waste Water	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C

Table 3.5.2-8 Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Liner, Liner Anchors, Integral Attachments (Tank Room or Compartment Liner)	Water retaining boundary	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-8 Radwaste Building (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Masonry walls are inspected as a part of the Structures Monitoring (B.2.1.34) program, which includes the ten attributes of the NUREG-1801 Masonry Walls (B.2.1.33) program.

Table 3.5.2-9
Reactor Building
Summary of Aging Management Evaluation

Table 3.5.2-9 Reactor Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bearing Pads	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	C
Blowout Panels	Pressure Relief	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-274	3.5.1-82	C
	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-274	3.5.1-82	C
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A2.TP-261	3.5.1-88	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A2.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Curbs	Direct Flow	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-23	3.5.1-64	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-23	3.5.1-64	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-23	3.5.1-64	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-23	3.5.1-64	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-23	3.5.1-64	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-23	3.5.1-64	A
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-108	3.5.1-42	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-108	3.5.1-42	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-108	3.5.1-42	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Shielding	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-108	3.5.1-42	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-108	3.5.1-42	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-108	3.5.1-42	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A
	Missile Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A
	Structural Pressure Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A
	Missile Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A
	Structural Pressure Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A2.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-204	3.5.1-43	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Structural Support	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A2.TP-67	3.5.1-47	A
Concrete: Interior	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	HELB/MELB Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Missile Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior	Structural Pressure Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
Equipment Supports and Foundations	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-23	3.5.1-64	A
Hatches/Plugs	Flood Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	HELB/MELB Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	HELB/MELB Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Missile Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A2.TP-25	3.5.1-54	A

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Masonry Walls: Interior	Missile Barrier	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A2.T-12	3.5.1-70	A, 3
	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A2.T-12	3.5.1-70	A, 3
	Shielding	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A2.T-12	3.5.1-70	A, 3
	Structural Support	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A2.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A2.T-12	3.5.1-70	A, 3
Metal Decking	Structural Support	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Metal Panels (Includes Steel and Lead-Filled Steel Shield Panels)	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
		Lead	Air - Indoor Uncontrolled	None	None			J, 1
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C
Metal Siding	Pressure Relief	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Metal Siding	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
	Structural Pressure Barrier	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
Spent Fuel Pool Gates	Water retaining boundary	Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Treated Water	Loss of Material	Water Chemistry (B.2.1.2)	III.A5.T-14	3.5.1-78	B, 2
Steel Components: Structural Steel	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Steel Elements: Fuel Pool Liner, Liner Anchors, and Integral Attachments	Structural Support	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Water retaining boundary	Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Treated Water	Loss of Material	Water Chemistry (B.2.1.2)	III.A5.T-14	3.5.1-78	B, 2
Steel Elements: Plates: includes Checkered Plate Covers	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A2.TP-302	3.5.1-77	C

Table 3.5.2-9 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Reactor Well, Dryer and Separator Pool, and Cask Loading Pit Liner, Liner Anchors, and Integral Attachments	Structural Support	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Water retaining boundary	Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Concrete	None	None	VII.J.AP-19	3.3.1-120	C
Steel Elements: Sump Liners and Integral Attachments	Water retaining boundary	Stainless Steel	Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Condensation	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C
			Waste Water	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C

Table 3.5.2-9 Reactor Building (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Lead shielding in an air-indoor uncontrolled environment has no applicable aging effects requiring management.

2. The spent fuel pool water level is monitored in accordance with technical specifications. Leakage from the leak chase channels is monitored in accordance with procedures.

3. Masonry walls are inspected as a part of the Structures Monitoring (B.2.1.34) program, which includes the ten attributes of the NUREG-1801 Masonry Walls (B.2.1.33) program.

Table 3.5.2-10
Structural Commodity Group
Summary of Aging Management Evaluation

Table 3.5.2-10 Structural Commodity Group

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bird Screen	Filter	Aluminum	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B5.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B5.TP-261	3.5.1-88	A
		Stainless Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.34)	III.B5.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.B5.TP-261	3.5.1-88	A
Cable Trays	Shelter, Protection	Aluminum	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Cable Trays	Shelter, Protection	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
	Structural Support	Aluminum	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
Compressible Joints and Seals	Shelter, Protection	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
	Water retaining boundary	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
			Treated Water	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
Conduit	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
	Structural Support	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Doors	Flood Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
	HELB/MELB Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Doors	Shelter, Protection	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Glass	Air - Indoor Uncontrolled	None	None	VII.J.AP-14	3.3.1-117	C
			Air - Outdoor	None	None	VII.J.AP-167	3.3.1-117	C
	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
	Structural Pressure Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
Insulation	Thermal Insulation	Calcium Silicate	Air - Indoor Uncontrolled	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-403	3.4.1-64	A
			Air - Outdoor	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-403	3.4.1-64	A
		Cellular Glass	Air - Indoor Uncontrolled	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-404	3.4.1-65	A
		Ceramic Fiber (includes Microtherm MPS)	Air - Indoor Uncontrolled	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-403	3.4.1-64	A
		Fiberglass	Air - Indoor Uncontrolled	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-403	3.4.1-64	A
			Air - Outdoor	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-403	3.4.1-64	A
		Foamed Plastic (includes Armaflex)	Air - Indoor Uncontrolled	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)			F, 1

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Insulation	Thermal Insulation	Polymers	Air - Indoor Uncontrolled	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)			F, 1
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
Insulation Jacketing (includes Clamps, Bands, and Fasteners)	Thermal Insulation Jacket Integrity	Aluminum	Air - Indoor Uncontrolled	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-403	3.4.1-64	A
			Air - Outdoor	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-403	3.4.1-64	A
		Plastic Mastic Jacketing	Air - Indoor Uncontrolled	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-404	3.4.1-65	A
		Stainless Steel	Air - Indoor Uncontrolled	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-403	3.4.1-64	A
			Air - Outdoor	Reduced Thermal Insulation Resistance	External Surfaces Monitoring of Mechanical Components (B.2.1.24)	VIII.I.S-403	3.4.1-64	A
Louver	Shelter, Protection	Aluminum	Air - Indoor Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-6	3.5.1-93	C
		Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-43	3.5.1-92	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-43	3.5.1-92	C
Metal Components (Spray Shields)	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-43	3.5.1-92	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Miscellaneous Steel (catwalks, stairs, handrails, ladders, platforms, etc.)	Structural Support	Aluminum	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Treated Water	Loss of Material	One-Time Inspection (B.2.1.21)	VII.E3.AP-130	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-130	3.3.1-25	D
		Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.B5.TP-43	3.5.1-92	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B5.TP-274	3.5.1-82	C
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B5.TP-274	3.5.1-82	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-6	3.5.1-93	C
Panels, Racks, Frames, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B3.TP-274	3.5.1-82	C
		Glass	Air - Indoor Uncontrolled	None	None	VII.J.AP-14	3.3.1-117	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Panels, Racks, Frames, Cabinets, and Other Enclosures	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B3.TP-274	3.5.1-82	C
		Glass	Air - Indoor Uncontrolled	None	None	VII.J.AP-14	3.3.1-117	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
Penetration Seals	Flood Barrier	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
			Groundwater/Soil	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
		Grout	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A, 2
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A, 2
	HELB/MELB Shielding	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
		Grout	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
	Pressure Boundary	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration Seals	Pressure Boundary	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
			Groundwater/Soil	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
		Grout	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A, 2
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A, 2
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A, 2
	Shelter, Protection	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
			Groundwater/Soil	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
		Grout	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A, 2

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration Seals	Shelter, Protection	Grout	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A, 2
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A, 2
	Shielding	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
		Grout	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A, 2
		Lead	Air - Indoor Uncontrolled	None	None			J, 3
	Structural Support	Grout	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A, 2
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A, 2
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A, 2

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration Seals	Structural Support	Grout	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A, 2
Penetration Sleeves (includes Sleeve Head Plates)	Flood Barrier	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Groundwater/Soil	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-219	3.5.1-79	C
	HELB/MELB Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Pressure Boundary	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Groundwater/Soil	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-219	3.5.1-79	C
	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Groundwater/Soil	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-219	3.5.1-79	C

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration Sleeves (includes Sleeve Head Plates)	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Groundwater/Soil	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-219	3.5.1-79	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-6	3.5.1-93	C
	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Lead	Air - Indoor Uncontrolled	None	None			J, 3
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Groundwater/Soil	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-219	3.5.1-79	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
Roofing	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	C

Table 3.5.2-10 Structural Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Seals, Gaskets, and Moisture Barriers (Caulking, Flashing and Other Sealants)	Flood Barrier	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
	HELB/MELB Shielding	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
	Pressure Boundary	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
	Shelter, Protection	Elastomer	Air - Indoor Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B4.TP-6	3.5.1-93	C
Tube Track	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	A
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
	Structural Support	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	A
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A

Table 3.5.2-10 Structural Commodity Group (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Foamed Plastic, Polymer and other insulation and insulation sealant materials are potentially subject to reduced thermal insulation resistance due to moisture intrusion and are managed by the External Surfaces Monitoring of Mechanical Components (B.2.1.24) program.
2. NUREG-1801 does not contain grout penetration seals, however, cracking, loss of bond, loss of material, and increase in porosity and permeability are applicable aging effects for both grout and concrete, and are managed for grout penetration seals by the Structures Monitoring (B.2.1.34) program.
3. Lead shielding in an air-indoor uncontrolled environment has no applicable aging effects requiring management.

Table 3.5.2-11
Switchyard Structures
Summary of Aging Management Evaluation

Table 3.5.2-11 Switchyard Structures

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
		Galvanized Steel Bolting	Air - Indoor Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
				None	None	III.B3.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-11 Switchyard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete Curbs	Direct Flow	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-24	3.5.1-63	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Above-grade Exterior (accessible areas)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
Concrete: Below-grade Exterior (inaccessible areas)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-11 Switchyard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation, Subfoundation (inaccessible areas)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-11 Switchyard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Structural Support	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Interior	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Equipment Supports and Foundations	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
			Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-11 Switchyard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Equipment Supports and Foundations	Structural Support	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-24	3.5.1-63	A
Hatches/Plugs	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
Manholes, Handholes, and Duct Banks (Trough)	Shelter, Protection	Ductile Cast Iron	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
			Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-11 Switchyard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Manholes, Handholes, and Duct Banks (Trough)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-24	3.5.1-63	A
Masonry Walls: Above-grade Exterior	Shelter, Protection	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
	Structural Support	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
Masonry Walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Structural Support	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
Steel Components: Structural Steel	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A

Table 3.5.2-11 Switchyard Structures (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Masonry walls are inspected as a part of the Structures Monitoring (B.2.1.34) program, which includes the ten attributes of the NUREG-1801 Masonry Walls (B.2.1.33) program.

Table 3.5.2-12

Tank Foundations and Dikes

Summary of Aging Management Evaluation

Table 3.5.2-12 Tank Foundations and Dikes

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Structural Support	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Foundation, Subfoundation (accessible areas - Cycled Condensate Tank Foundation)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
Concrete: Foundation, Subfoundation (inaccessible areas - Cycled Condensate Tank Foundation)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A

Table 3.5.2-12 Tank Foundations and Dikes (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas - Cycled Condensate Tank Foundation)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Seals, Gaskets, and Moisture Barriers (Caulking, Flashing and Other Sealants)	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Aboveground Metallic Tanks (B.2.1.18)	III.A6.TP-7	3.5.1-72	E, 1
					Structures Monitoring (B.2.1.34)	III.A6.TP-7	3.5.1-72	A
Steel Elements (Cycled Condensate Tank Valve Enclosures)	Shelter, Protection	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	C

Table 3.5.2-12 Tank Foundations and Dikes (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. The Aboveground Metallic Tanks (B.2.1.18) program requires inspection of seals at the base of tanks. Therefore, the Aboveground Metallic Tanks (B.2.1.18) program will also manage the aging of the seal between at the bottom edge of the Cycled Condensate Tank and its foundation.

Table 3.5.2-13
Turbine Building
Summary of Aging Management Evaluation

Table 3.5.2-13 Turbine Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Blowout Panels	Pressure Relief	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	C
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Curbs	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-13 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (accessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A

Table 3.5.2-13 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade Exterior (inaccessible areas)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A6.TP-104	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade Exterior (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-13 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade Exterior (inaccessible areas)	Shelter, Protection	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation, Subfoundation (inaccessible areas)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A

Table 3.5.2-13 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Concrete: Interior	Flood Barrier	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-13 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior	Shelter, Protection	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shielding	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Equipment Supports and Foundations	Structural Support	Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Hatches/Plugs	Shelter, Protection	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
	Shielding	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A

Table 3.5.2-13 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Reinforced concrete	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
Masonry Walls: Above-grade Exterior	Shelter, Protection	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
	Shielding	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
	Structural Support	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.33)	III.A5.TP-34	3.5.1-71	A, 1
Masonry Walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
	Shielding	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1

Table 3.5.2-13 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Masonry Walls: Interior	Structural Support	Concrete Block	Air - Indoor Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.33)	III.A3.T-12	3.5.1-70	A, 1
Metal Decking	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
	Structural Support	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
Metal Siding	Pressure Relief	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
	Shelter, Protection	Galvanized Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.B2.TP-6	3.5.1-93	C
Pipe Whip Restraints	Pipe Whip Restraint	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	C
		Stainless Steel	Air - Indoor Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Steel Components: Structural Steel	Structural Support	Carbon Steel	Air - Indoor Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
Steel Elements: Liner, Liner Anchors, Integral Attachments (Sump Liner)	Water retaining boundary	Stainless Steel	Concrete	None	None	VII.J.AP-19	3.3.1-120	C

Table 3.5.2-13 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Elements: Liner, Liner Anchors, Integral Attachments (Sump Liner)	Water retaining boundary	Stainless Steel	Condensation	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-273	3.3.1-95	C
			Waste Water	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)	VII.E5.AP-278	3.3.1-95	C

Table 3.5.2-13 Turbine Building (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Masonry walls are inspected as a part of the Structures Monitoring (B.2.1.34) program, which includes the ten attributes of the NUREG-1801 Masonry Walls (B.2.1.33) program.

Table 3.5.2-14
Yard Structures
Summary of Aging Management Evaluation

Table 3.5.2-14 Yard Structures

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
		Galvanized Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.34)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Foundation, Subfoundation (accessible areas - Transformers, Transmission and Take Off Towers)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A

Table 3.5.2-14 Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation, Subfoundation (inaccessible areas - Transformers, Transmission and Take Off Towers)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Manholes, Handholes, and Duct Banks	Shelter, Protection	Ductile Cast Iron	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
			Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A

Table 3.5.2-14 Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Manholes, Handholes, and Duct Banks	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Ductile Cast Iron	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-26	3.5.1-66	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-25	3.5.1-54	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-23	3.5.1-64	A
			Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.34)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-212	3.5.1-65	A
				Cracking	Structures Monitoring (B.2.1.34)	III.A3.TP-204	3.5.1-43	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.34)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-14 Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Manholes, Handholes, and Duct Banks	Structural Support	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.34)	III.A3.TP-67	3.5.1-47	A
Transmission Towers (includes Take Off Towers)	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.34)	III.A3.TP-302	3.5.1-77	A

Table 3.5.2-14 Yard Structures (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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:

None.

3.6 AGING MANAGEMENT OF ELECTRICAL COMPONENTS

3.6.1 INTRODUCTION

This section provides the results of the aging management review for the electrical commodity groups identified in Section 2.5, Electrical, as being subject to aging management review. The electrical commodity groups, which are addressed in this section, are described in the indicated sections.

- Cable Connections (Metallic Parts) (2.5.2.5.1)
- Electric Penetrations (2.5.2.5.2)
- High Voltage Insulators (2.5.2.5.3)
- Insulation Material for Electrical Cables and Connections (2.5.2.5.4)
- Metal Enclosed Bus (2.5.2.5.5)
- Switchyard Bus and Connections, Transmission Conductors, and Transmission Connectors (2.5.2.5.6)

The electrical commodity groups which are addressed in this section are described in the indicated sections. Electrical Penetrations are not subject to their own aging management review in this section in that they are addressed 1) as a TLAA in the Environmental Qualification (EQ) of Electric Components (B.3.1.3) program and 2) in the primary containment aging management review.

3.6.2 RESULTS

The following tables summarize the results of the aging management review for Electrical Commodities.

Table 3.6.2-1 Electrical Commodities - Summary of Aging Management Evaluation

3.6.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Management Programs

3.6.2.1.1 Cable Connections (Metallic Parts)

Materials

The materials of construction for the Cable Connections (Metallic Parts) are:

- Various 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

Aging Effect Requiring Management

The following aging effect associated with the Cable Connections (Metallic Parts) requires management:

- Increased Resistance of Connection

Aging Management Program

The following aging management program manages the aging effects for the Cable Connections (Metallic Parts):

- Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.41)

3.6.2.1.2 High Voltage Insulators

Materials

The materials of construction for High Voltage Insulators are:

- Porcelain
- Malleable Iron
- Aluminum
- Galvanized Steel
- Cement

Environment

The High Voltage Insulators are exposed to the following environment:

- Air – Outdoor

Aging Effects Requiring Management

The High Voltage Insulators have no aging effects requiring management. See subsection 3.6.2.2.2 for further evaluation.

Aging Management Programs

Because there are no aging effects requiring management, no aging management programs are required for the High Voltage Insulators.

3.6.2.1.3 Insulation Material for Electrical Cables and Connections

The insulation material for electrical cables and connections commodity group was broken down for aging management review of insulation into subcategories based on categorization in NUREG-1801:

- Conductor Insulation for Inaccessible Power Cables Greater Than or Equal to 400V
- Insulation Material for Electrical Cables and Connections
- Insulation Material for Electrical Cables and Connections Used in Instrumentation Circuits

This insulation material commodity group includes insulated cables and connections, splices, electrical penetration pigtails, terminal blocks, and fuse holders.

Materials

The materials of construction for Insulation Material for Electrical Cables and Connections are:

- Various Organic Polymers

Environment

The Insulation Material for Electrical Cables and Connections are exposed to the following environment:

- Adverse Localized Environment

Aging Effect Requiring Management

The following aging effect associated with the Insulation Material for Electrical Cables and Connections requires management:

- Reduced Insulation Resistance

Aging Management Programs

The following aging management programs manage the aging effects for the Insulation Material for Electrical Cables and Connections:

- Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.39)
- Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.37)
- Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (B.2.1.38)

3.6.2.1.4 Metal Enclosed Bus

Materials

The materials of construction for the Metal Enclosed Bus are:

- Various Metals Used for Electrical Bus and Connections
- Elastomers
- Aluminum
- Porcelain, Various Organic Polymers

Environments

The Metal Enclosed Bus are exposed to the following environments:

- Air – Indoor, Controlled
- Air – Indoor, Uncontrolled
- Air – Outdoor

Aging Effects Requiring Management

The following aging effects associated with the Metal Enclosed Bus require management:

- Increased Resistance of Connection
- Surface Cracking, Crazing, Scuffing, Dimensional Change, Shrinkage, Discoloration, Hardening and Loss of Strength
- Loss of Material
- Reduced Insulation Resistance

Aging Management Program

The following aging management program manages the aging effects for the Metal Enclosed Bus:

- Metal Enclosed Bus (B.2.1.40)

3.6.2.1.5 Switchyard Bus and Connections, Transmission Conductors, Transmission Connectors

Materials

The materials of construction for the Switchyard Bus and Connections, Transmission Conductors, and Transmission Connectors are:

- Aluminum, Stainless Steel
- Aluminum, Steel
- Stainless Steel

Environment

The Switchyard Bus and Connections, Transmission Conductors, and Transmission Connectors are exposed to the following environment:

- Air - Outdoor

Aging Effects Requiring Management

The Switchyard Bus and Connections, Transmission Conductors, and Transmission Connectors have no aging effects requiring management. See Subsection 3.6.2.2.3 for further evaluation.

Aging Management Programs

Because there are no aging effects requiring management, no aging management programs are required for the Switchyard Bus and Connections, Transmission Conductors, and Transmission Connectors.

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. For the Electrical Commodities, those programs are addressed in the following subsections.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

Environmental qualification is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The evaluation of this TLAA is addressed separately in Section 4.4, “Environmental Qualification (EQ) of Electrical Equipment,” of this SRP-LR.

The evaluation of this TLAA is addressed in Section 4.4, “Environmental Qualification (EQ) of Electric Components,” of this application.

3.6.2.2.2 Reduced Insulation Resistance due to Presence of Any Salt Deposits and Surface Contamination, and Loss of Material due to Mechanical Wear Caused by Wind Blowing on Transmission Conductors

Reduced insulation resistance due to presence of any salt deposits and surface contamination could occur in high-voltage insulators. The GALL Report recommends further evaluation of a plant-specific AMP for plants located such that the potential exists for salt deposits or surface contamination (e.g., in the vicinity of salt water bodies or industrial pollution). Loss of material due to mechanical wear caused by wind blowing on transmission conductors could occur in high-voltage insulators. 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 (Appendix A.1 of this SRP-LR).

The high voltage insulators evaluated for LSCS are those used to support in scope, uninsulated, high voltage electrical commodities such as transmission conductors and switchyard bus. The supported commodities are those credited for supplying power to in scope components and for recovery of offsite power following a station blackout.

Salt Deposits and Surface Contamination

Various airborne materials such as dust, salt, and industrial effluents can contaminate insulator surfaces. The buildup of surface contamination is gradual and in most areas such contamination is washed away by rain; the glazed insulator surface aids this contamination removal. A large buildup of contamination enables the conductor voltage to track along the surface more easily and can lead to insulator flashover. Surface contamination can be a problem in areas where there are greater concentrations of airborne particles such as near facilities that discharge soot or near the seacoast where salt spray is prevalent.

LSCS is not located near a seacoast. It is located inland, in northeastern Illinois, 75 miles southwest of Chicago. LSCS is located in an area where industrial airborne particle concentrations are comparatively low, since it is located in a rural area with no heavy industry nearby. Minor contamination is washed away by rainfall or snow, and cumulative build up has not been experienced and is not expected to occur.

Based on LSCS's location and confirmed by its operating experience, surface contamination is not a significant aging effect for LSCS. Therefore, aging management activities for surface contamination from dust, salt, and industrial effluents are not required for the period of extended operation.

Mechanical Wear

Mechanical wear is an aging effect for strain and suspension insulators in that they are subject to movement. Movement can be caused by wind blowing the supported transmission conductor, causing it to swing from side to side. If this swinging is frequent enough, it could cause wear in the metal contact points of the insulator string and between an insulator and the supporting hardware. Although this mechanism is possible, experience has shown that the transmission conductors do not normally swing and that when they do, due to substantial wind, they do not continue to swing for very long once the wind has subsided.

Wind loading that can cause a transmission line insulator to sway is considered in the design and installation. Although rare, surface rust of the metallic cap may form where galvanizing is burnt off due to flashover from lightning strikes. Surface rust is not a significant concern and would not cause a loss of intended function if left unmanaged for the period of extended operation. Wear and surface rust have not been identified during routine switchyard inspections.

Based on LSCS's design and confirmed by its operating experience, mechanical wear caused by wind blowing on transmission conductors is not significant enough to cause a loss of intended function. Therefore, aging management activities for loss of material due to mechanical wear is not required for the period of extended operation.

Conclusion

Aging management activities for LSCS high voltage insulators are not required for the period of extended operation.

3.6.2.2.3 Loss of Material due to Wind-Induced Abrasion, Loss of Conductor Strength due to Corrosion, and Increased Resistance of Connection due to Oxidation or Loss of Pre-load

Loss of material due to wind-induced abrasion, loss of conductor strength due to corrosion, and increased resistance of connection due to oxidation or loss of pre-load could occur in transmission conductors and connections, and in switchyard bus and connections. 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 (Appendix A.1 of this SRP-LR).

The switchyard bus and connections, transmission conductors, and transmission connectors evaluated for LSCS are those credited for supplying power to in scope components and for recovery of offsite power following a station blackout.

Wind-Induced Abrasion and Fatigue – Transmission Conductors

Transmission conductor vibration or sway could be caused by wind loading. Industry experience has shown that the transmission conductors do not normally swing significantly. When transmission conductors do swing due to a substantial wind, they do not continue to swing for very long once the wind has subsided. Wind loading that can cause a transmission line to vibrate or sway is considered in design and installation. Therefore, the loss of material aging effect that could result from wind-induced transmission conductor vibration or sway is not applicable and would not cause a loss of intended function for transmission conductors for the period of extended operation.

Corrosion – Transmission Conductors

The in scope transmission conductors at LSCS are the connections from Bus 13 and Bus 6 in the 345 kV switchyard to the System Auxiliary Transformers 142 and 242, respectively, which are adjacent to the power block. These conductors are 2156 MCM 84/19 aluminum conductor steel reinforced (ACSR). Each phase has one conductor. The 2156 MCM 84/19 ACSR transmission conductor is a large, substantial transmission conductor. It is approximately 1.8 inches in diameter and is configured with 19 steel conductors wrapped by 84 aluminum conductors. The rated or ultimate strength per American Society for Testing and Materials (ASTM) standards and National Electric Safety Code (NESC) heavy load tension requirements of 2156 MCM ACSR are 60,300 lbs. and 36,180 lbs., respectively.

The ComEd Transmission and Distribution design practices follow the NESC methodologies. The NESC requires that tension on installed conductors be a maximum of 60 percent of the ultimate conductor strength. The NESC also sets the maximum tension a conductor must be designed to withstand heavy load requirements, which include consideration of ice, wind, and temperature.

The most prevalent contribution to loss of conductor strength of an ACSR transmission conductor is corrosion, which includes corrosion of the steel core and aluminum strand pitting. For ACSR conductors, degradation begins as a loss of zinc from the galvanized steel core wires. Corrosion rates depend largely on air quality which includes suspended particles chemistry, sulfur dioxide (SO_2) concentration in air, precipitation, fog chemistry, and meteorological conditions.

Ontario Hydroelectric performed a study that is documented in 1992 IEEE Transactions on Power Delivery. The papers present the methodology and results of both field and laboratory tests on ACSR conductors from Ontario Hydroelectric's older transmission lines. The field tests were performed on-line, to detect steel core galvanizing loss by using an overhead line conductor corrosion detector. Potential conductor degradation is measured by an eddy current sensor that travels along the conductor, between transmission towers. Laboratory tests were performed for fatigue, tensile strength, torsional ductility, and electrical performance. The fatigue tests simulating 50 years of service life were performed to assess existing cables as well as a new cable. The tensile strength was assessed by the individual wire method, and torsional ductility was assessed by the twist to failure method. Both the tensile strength and torsional ductility tests were performed in accordance with published standards. Additional considerations in the performance of these aging assessments included metallurgical data and analysis for potential environmental contributors. Tests performed by Ontario Hydroelectric showed a 30 percent loss of composite conductor strength of an 80-year-old ACSR conductor due to corrosion. The LSCS in scope transmission conductors are the same type of transmission conductors evaluated in the Ontario Hydroelectric study and in the EPRI License Renewal Electrical Handbook. The test methodology as published in the IEEE Transactions on Power Delivery is applicable to in scope LSCS transmission conductors.

LSCS is located in an area where industrial airborne particle concentrations are comparatively low, since it is located in a rural area with no heavy industry nearby. In the Ontario Hydroelectric Study, the conductors most affected by atmospheric corrosion were located in areas subject to pollution sources and a major urban area. Therefore, the environmental impact to the LSCS transmission conductors (which are located in a rural area) are bounded by the Ontario Hydroelectric conductors (which are located in polluted and urban environments).

An example presented in the EPRI License Renewal Handbook, 1013475, compares a 4/0 conductor to the results of the Ontario Hydroelectric Study. The EPRI License Renewal Electrical Handbook evaluation documents that a 4/0 ACSR conductor (equivalent to a 211 MCM conductor size), which was included in the Ontario Hydroelectric study, has the smallest ultimate strength margin. Larger, more substantial transmission conductors (e.g., 336.4 MCM 30/7 conductors) that had a greater strength margin were bounded by the 4/0, 6/1 ACSR conductor example. The LSCS transmission conductors are physically more substantial than the limiting 4/0 ACSR conductor. NESC requirements and the handbook guidance are used to evaluate the in scope transmission conductors at LSCS.

Assuming a 30 percent loss of strength as demonstrated by the Ontario Hydroelectric tests, there would still be significant margin between what is required by the NESC and actual conductor strength. The margin between the NESC heavy load and the ultimate strength is 24,120 lbs. The Ontario Hydroelectric study showed a 30 percent loss of composite conductor strength in an 80 year old conductor. In the case of the 2156 MCM ACSR transmission conductors, a 30 percent loss of ultimate strength would mean that there would still be a 6,030 lbs. margin between the 80-year old ultimate strength and the strength required by the NESC. Therefore the design and physical construction of the LSCS in scope transmission conductors' strength margin is bounded by the handbook analysis of the 4/0 ACSR conductor and is also bounded by the Ontario Hydroelectric study.

2156 MCM 84/19 ACSR Transmission Conductor	
Ultimate Strength, New	60,300 lbs.
Postulated Ultimate Strength at 80 Years	42,210 lbs.
NESC Design Strength, Required	36,180 lbs.
NESC Heavy Load Tension, Required	10,000 lbs.

In conclusion, the in scope LSCS transmission conductors are bounded by the Ontario Hydroelectric study by test methodology, design and construction, and environment. The above evaluations demonstrate with reasonable assurance that transmission conductors will have ample strength margin through the period of extended operation. Therefore, based on LSCS design and confirmed by their operating experience, the loss of transmission conductor strength is not applicable and would not cause a loss of intended function for transmission conductors for the period of extended operation.

Oxidation or Loss of Pre-Load – Transmission Connectors

Transmission connectors employ good bolting practices. The connections are treated with corrosion inhibitors to avoid connection oxidation and torqued at the time of installation to avoid loss of pre-load. The transmission connectors are designed and installed using stainless steel lock washers that provide vibration absorption and prevent loss of preload. Therefore, based on LSCS design and confirmed by their operating experience, oxidation and loss of preload are not applicable aging mechanisms.

Wind-Induced Abrasion and Fatigue – Switchyard Bus

Switchyard buses are connected to flexible conductors that do not normally vibrate and are supported by insulators and ultimately by static, structural components, such as concrete footings and structural steel. Switchyard bus is rigidly mounted and is therefore not subject to abrasion induced by wind loading. Therefore, based on LSCS design and confirmed by their operating experience, wind-induced abrasion and fatigue are not applicable to LSCS switchyard bus.

Corrosion – Switchyard Bus

LSCS switchyards are not subject to a saline environment or industrial air pollution. It is located inland, in northeastern Illinois, 75 miles southwest of Chicago. LSCS is located in an area where industrial airborne particle concentrations are comparatively low, since it is located in a rural area with no heavy industry nearby. Aluminum bus material does not experience any appreciable aging effects in this environment. Therefore, based on LSCS design and confirmed by their operating experience, corrosion is not an applicable aging mechanism.

Oxidation or Loss of Pre-Load – Switchyard Bus Connections

Switchyard bus connections employ good bolting practices. The connections are treated with corrosion inhibitors to avoid connection oxidation and torqued at the time of installation to avoid loss of pre-load. The switchyard bus bolted connections are designed and installed using stainless steel lock washers that provide vibration absorption and prevent loss of preload. Therefore, based on LSCS design and confirmed by their operating experience, oxidation and loss of preload are not applicable aging mechanisms.

Conclusion

Aging management activities for LSCS switchyard bus and connections, transmission conductors, and transmission connectors are not required for the period of extended operation.

3.6.2.2.4 Quality Assurance for Aging Management of Nonsafety-Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.6.2.2.5 Ongoing Review of Operating Experience

Ongoing review of operating experience is addressed in Appendix A, Section A.1.6 and Appendix B, Section B.1.4.

3.6.2.3 AMR Results Not Consistent With or Not Addressed in the GALL Report

LSCS Electrical Commodity AMR results are consistent with Electrical Commodity AMR line items as presented in NUREG-1801.

3.6.2.4 Time-Limited Aging Analysis

The time-limited aging analysis identified below is associated with Electrical Commodities:

- Section 4.4, Environmental Qualification (EQ) of Electric Components.

3.6.3 CONCLUSION

The Electrical Commodities that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Electrical Commodities are identified in the summaries in Section 3.6.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Electrical Commodities will be adequately managed so that there is reasonable assurance that the intended functions are 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 Components

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 EQ requirements composed of Various polymeric and metallic materials exposed to Adverse localized environment caused by heat, radiation, oxygen, moisture, or voltage	Various aging effects due to various mechanisms in accordance with 10 CFR 50.49	EQ is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.4, "Environmental Qualification (EQ) of Electrical Equipment," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1)(i) and (ii). See Chapter X.E1, "Environmental Qualification (EQ) of Electric Components," of this report for meeting the requirements of 10 CFR 54.21(c)(1)(iii).	Yes, TLAA	Environmental Qualification is a TLAA; further evaluation is documented in Subsection 3.6.2.2.1.
3.6.1-2	High-voltage insulators composed of Porcelain; malleable iron; aluminum; galvanized steel; cement exposed to Air – outdoor	Loss of material due to mechanical wear caused by wind blowing on transmission conductors	A plant-specific aging management program is to be evaluated	Yes, plant-specific	Not applicable. NUREG-1801, loss of material aging effects are not applicable to LSCS. See subsection 3.6.2.2.2 for further evaluation.

Table 3.6.1 Summary of Aging Management Evaluations for the Electrical Components

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-3	High-voltage insulators composed of Porcelain; malleable iron; aluminum; galvanized steel; cement exposed to Air – outdoor	Reduced insulation resistance due to presence of salt deposits or surface contamination	A plant-specific aging management program is to be evaluated for plants located such that the potential exists for salt deposits or surface contamination (e.g., in the vicinity of salt water bodies or industrial pollution)	Yes, plant-specific	Not applicable. NUREG-1801, reduced insulation resistance aging effects are not applicable to LSCS. See subsection 3.6.2.2.2 for further evaluation.
3.6.1-4	Transmission conductors composed of Aluminum; steel exposed to Air - outdoor	Loss of conductor strength due to corrosion	A plant-specific aging management program is to be evaluated for ACSR	Yes, plant-specific	Not applicable. NUREG-1801, loss of conductor strength aging effects are not applicable to LSCS. See subsection 3.6.2.2.3 for further evaluation.
3.6.1-5	Transmission connectors composed of Aluminum; steel exposed to Air - outdoor	Increased resistance of connection due to oxidation or loss of pre-load	A plant-specific aging management program is to be evaluated	Yes, plant-specific	Not applicable. NUREG-1801, increased resistance of connection aging effects are not applicable to LSCS. See subsection 3.6.2.2.3 for further evaluation.
3.6.1-6	Switchyard bus and connections composed of Aluminum; copper; bronze; stainless steel; galvanized steel exposed to Air – outdoor	Loss of material due to wind-induced abrasion; Increased resistance of connection due to oxidation or loss of pre-load	A plant-specific aging management program is to be evaluated	Yes, plant-specific	Not applicable. NUREG-1801, loss of material and increased resistance of connection aging effects are not applicable to LSCS. See subsection 3.6.2.2.3 for further evaluation.

Table 3.6.1 Summary of Aging Management Evaluations for the Electrical Components

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-7	Transmission conductors composed of Aluminum; Steel exposed to Air - outdoor	Loss of material due to wind-induced abrasion	A plant-specific aging management program is to be evaluated for ACAR and ACSR	Yes, plant-specific	Not applicable. NUREG-1801, loss of material aging effects are not applicable to LSCS. See subsection 3.6.2.2.3 for further evaluation.
3.6.1-8	Insulation material for electrical cables and connections (including terminal blocks, fuse holders, etc.) composed of Various organic polymers (e.g., EPR, SR, EPDM, XLPE) exposed to Adverse localized environment caused by heat, radiation, or moisture	Reduced insulation resistance due to thermal /thermoxidative degradation of organics, radiolysis, and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion	Chapter XI.E1, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No	Consistent with NUREG-1801. The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.37) program will be used to manage reduced insulation resistance of the various organic polymer insulation material in electrical cables and connections, including terminal blocks, fuse holders, splices and electrical penetration pigtails, exposed to an adverse localized environment caused by heat, radiation, or moisture.

Table 3.6.1 Summary of Aging Management Evaluations for the Electrical Components

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-9	Insulation material for electrical cables and connections used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance (IR) composed of Various organic polymers (e.g., EPR, SR, EPDM, XLPE) exposed to Adverse localized environment caused by heat, radiation, or moisture	Reduced insulation resistance due to thermal/ thermoxidative degradation of organics, radiolysis, and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion	Chapter XI.E2, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits"	No	Consistent with NUREG-1801. The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (B.2.1.38) program will be used to manage reduced insulation resistance of the various organic polymer insulation material in electrical cables and connections used in instrumentation circuits, including terminal blocks, fuse holders, splices and electrical penetration pigtails, exposed to an adverse localized environment caused by heat, radiation, or moisture.
3.6.1-10	Conductor insulation for inaccessible power cables greater than or equal to 400 volts (e.g., installed in conduit or direct buried) composed of Various organic polymers (e.g., EPR, SR, EPDM, XLPE) exposed to Adverse localized environment caused by significant moisture	Reduced insulation resistance due to moisture	Chapter XI.E3, "Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No	Consistent with NUREG-1801. The Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.39) program will be used to manage reduced insulation resistance of the various organic polymer conductor insulation for inaccessible power cables greater than or equal to 400 volts, exposed to an adverse localized environment caused by significant moisture.

Table 3.6.1 Summary of Aging Management Evaluations for the Electrical Components

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-11	Metal enclosed bus: enclosure assemblies composed of Elastomers exposed to Air – indoor, controlled or uncontrolled or Air – outdoor	Surface cracking, crazing, scuffing, dimensional change (e.g. “ballooning” and “necking”), shrinkage, discoloration, hardening and loss of strength due to elastomer degradation	Chapter XI.E4, "Metal Enclosed Bus," or Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Metal Enclosed Bus (B.2.1.40) program will be used to manage surface cracking, crazing, scuffing, dimensional change, shrinkage, discoloration, hardening and loss of strength of the elastomers in metal enclosed bus: enclosure assemblies exposed to air – indoor, controlled or uncontrolled, or air - outdoor.
3.6.1-12	Metal enclosed bus: bus/connections composed of Various metals used for electrical bus and connections exposed to Air – indoor, controlled or uncontrolled or Air – outdoor	Increased resistance of connection due to the loosening of bolts caused by thermal cycling and ohmic heating	Chapter XI.E4, "Metal Enclosed Bus"	No	Consistent with NUREG-1801. The Metal Enclosed Bus (B.2.1.40) program will be used to manage increased resistance of connection of the various metals used for electrical bus and connections in metal enclosed bus: bus/connections exposed to air – indoor, controlled or uncontrolled, or air - outdoor.
3.6.1-13	Metal enclosed bus: insulation; insulators composed of Porcelain; xenoy; thermo-plastic organic polymers exposed to Air – indoor, controlled or uncontrolled or Air – outdoor	Reduced insulation resistance due to thermal/ thermoxidative degradation of organics/ thermoplastics, radiation-induced oxidation, moisture/debris intrusion, and ohmic heating	Chapter XI.E4, "Metal Enclosed Bus"	No	Consistent with NUREG-1801. The Metal Enclosed Bus (B.2.1.40) program will be used to manage reduced insulation resistance of the porcelain, various organic polymers in metal enclosed bus: insulation, insulators exposed to air – indoor, controlled or uncontrolled, or air - outdoor.

Table 3.6.1 Summary of Aging Management Evaluations for the Electrical Components

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-14	Metal enclosed bus: external surface of enclosure assemblies composed of Steel exposed to Air – indoor, uncontrolled or Air - outdoor	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.E4, "Metal Enclosed Bus," or Chapter XI.S6, "Structures Monitoring"	No	Not Applicable. There are no steel in metal enclosed bus, external surface enclosure assemblies, exposed to an air – outdoor environment that are in the scope of license renewal at LSCS.
3.6.1-15	Metal enclosed bus: external surface of enclosure assemblies composed of Galvanized steel; aluminum exposed to Air – outdoor	Loss of material due to pitting and crevice corrosion	Chapter XI.E4, "Metal Enclosed Bus," or Chapter XI.S6, "Structures Monitoring"	No	Consistent with NUREG-1801. The Metal Enclosed Bus (B.2.1.40) program will be used to manage loss of material/pitting and crevice corrosion of the aluminum in metal enclosed bus: external surface of enclosure assemblies exposed to air – outdoor.

Table 3.6.1 Summary of Aging Management Evaluations for the Electrical Components					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.6.1-16	Fuse holders (not part of active equipment): metallic clamps composed of Various metals used for electrical connections exposed to Air – indoor, uncontrolled	Increased resistance of connection due to chemical contamination, corrosion, and oxidation (in an air, indoor controlled environment, increased resistance of connection due to chemical contamination, corrosion and oxidation do not apply); fatigue due to ohmic heating, thermal cycling, electrical transients	Chapter XI.E5, "Fuse Holders"	No	Not Applicable. There are no fuse holders (not part of active equipment): metallic clamps exposed to an air – indoor, uncontrolled environment that are in the scope of license renewal at LSCS. See subsection 2.5.2.3 for more information.
3.6.1-17	Fuse holders (not part of active equipment): metallic clamps composed of Various metals used for electrical connections exposed to Air – indoor, controlled or uncontrolled	Increased resistance of connection due to fatigue caused by frequent manipulation or vibration	Chapter XI.E5, "Fuse Holders" No aging management program is required for those applicants who can demonstrate these fuse holders are located in an environment that does not subject them to environmental aging mechanisms or fatigue caused by frequent manipulation or vibration	No	Not Applicable. There are no fuse holders (not part of active equipment): metallic clamps exposed to an air – indoor, controlled or uncontrolled environment that are in the scope of license renewal at LSCS. See subsection 2.5.2.3 for more information.

Table 3.6.1 Summary of Aging Management Evaluations for the Electrical Components

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-18	Cable connections (metallic parts) composed of Various metals used for electrical contacts exposed to Air - indoor, controlled or uncontrolled or Air - outdoor	Increased resistance of connection due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation	Chapter XI.E6, "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 (B.2.1.41) program will be used to manage increased resistance of connection of the various metals used for electrical contacts in the metallic parts of cable connections, exposed to air – indoor, controlled or uncontrolled, or air - outdoor.
3.6.1-19	PWRs Only				
3.6.1-20	Transmission conductors composed of Aluminum exposed to Air – outdoor	Loss of conductor strength due to corrosion	None - for Aluminum Conductor Aluminum Alloy Reinforced (ACAR)	None	Not Applicable. There are no aluminum transmission conductors exposed to an air outdoor environment that are in the scope of license renewal at LSCS.

Table 3.6.1 Summary of Aging Management Evaluations for the Electrical Components					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.6.1-21	Fuse holders (not part of active equipment): insulation material, Metal enclosed bus: external surface of enclosure assemblies composed of Insulation material: bakelite; phenolic melamine or ceramic; molded polycarbonate; other, Galvanized steel; aluminum, Steel exposed to Air – indoor, controlled or uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

Table 3.6.2-1
Electrical Commodities
Summary of Aging Management Evaluation

Table 3.6.2-1 Electrical Commodities

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Cable Connections (Metallic Parts)	Electrical Continuity	Various Metals Used for Electrical Contacts	Air – Indoor, Controlled or Uncontrolled, or Air - Outdoor	Increased Resistance of Connection	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.41)	VI.A.LP-30	3.6.1-18	A
Conductor Insulation for Inaccessible Power Cables Greater Than or Equal to 400 Volts	Insulate (Electrical)	Various Organic Polymers	Adverse Localized Environment	Reduced Insulation Resistance	Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.39)	VI.A.LP-35	3.6.1-10	A
Electrical Equipment Subject to 10 CFR 50.49 EQ Requirements	Electrical Continuity	Various Metallic Materials	Adverse Localized Environment	Various Aging Effects	Environmental Qualification (EQ) of Electric Components (B.3.1.3)	VI.B.L-05	3.6.1-1	A
	Insulate (Electrical)	Various Polymeric Materials	Adverse Localized Environment	Various Aging Effects	Environmental Qualification (EQ) of Electric Components (B.3.1.3)	VI.B.L-05	3.6.1-1	A
High Voltage Insulators	Insulate (Electrical)	Porcelain; Malleable Iron; Aluminum; Galvanized Steel; Cement	Air – Outdoor	None	None	VI.A.LP-32	3.6.1-2	I, 1
						VI.A.LP-28	3.6.1-3	I, 2

Table 3.6.2-1 Electrical Commodities (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Insulation Material for Electrical Cables and Connections	Insulate (Electrical)	Various Organic Polymers	Adverse Localized Environment	Reduced Insulation Resistance	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.37)	VI.A.LP-33	3.6.1-8	A
Insulation Material for Electrical Cables and Connections Used in Instrumentation Circuits	Insulate (Electrical)	Various Organic Polymers	Adverse Localized Environment	Reduced Insulation Resistance	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (B.2.1.38)	VI.A.LP-34	3.6.1-9	A
Metal Enclosed Bus: Bus/Connections	Electrical Continuity	Various Metals Used for Electrical Bus and Connections	Air – Indoor, Controlled or Uncontrolled, or Air - Outdoor	Increased Resistance of Connection	Metal Enclosed Bus (B.2.1.40)	VI.A.LP-25	3.6.1-12	A
Metal Enclosed Bus: Enclosure Assemblies	Shelter, Protection	Elastomers	Air – Indoor, Controlled or Uncontrolled, or Air - Outdoor	Surface Cracking, Crazing, Scuffing, Dimensional Change, Shrinkage, Discoloration, Hardening and Loss of Strength	Metal Enclosed Bus (B.2.1.40)	VI.A.LP-29	3.6.1-11	A
Metal Enclosed Bus: External Surface of Enclosure Assemblies	Shelter, Protection	Aluminum	Air – Outdoor	Loss of Material	Metal Enclosed Bus (B.2.1.40)	VI.A.LP-42	3.6.1-15	A
		Aluminum	Air – Indoor, Controlled or Uncontrolled	None	None	VI.A.LP-41	3.6.1-21	A
Metal Enclosed Bus: Insulation, Insulators	Insulate (Electrical)	Porcelain, Various Organic Polymers	Air – Indoor, Controlled or Uncontrolled, or Air - Outdoor	Reduced Insulation Resistance	Metal Enclosed Bus (B.2.1.40)	VI.A.LP-26	3.6.1-13	A

Table 3.6.2-1 Electrical Commodities (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Switchyard Bus and Connections	Electrical Continuity	Aluminum, Stainless Steel	Air – Outdoor	None	None	VI.A.LP-39	3.6.1-6	I, 3
Transmission Conductors	Electrical Continuity	Aluminum, Steel	Air – Outdoor	None	None	VI.A.LP-47	3.6.1-7	I, 4
						VI.A.LP-38	3.6.1-4	I, 5
Transmission Connectors	Electrical Continuity	Stainless Steel	Air – Outdoor	None	None	VI.A.LP-48	3.6.1-5	I, 6

Table 3.6.2-1 Electrical Commodities (Continued)

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different 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. Based on LSCS design and operating experience, loss of material is not an applicable aging effect for LSCS high voltage insulators. In scope high voltage insulators comprised of porcelain, malleable iron, aluminum, galvanized steel, and cement in an air – outdoor environment are not subject to mechanical wear caused by wind blowing on transmission conductors. For more information see LRA Section 3.6.2.2.2.

2. Based on LSCS design and operating experience, reduced insulation resistance is not an applicable aging effect for LSCS high voltage insulators. In scope high voltage insulators comprised of porcelain, malleable iron, aluminum, galvanized steel, and cement in an air – outdoor environment are not subject to contamination. For more information see LRA Section 3.6.2.2.2.

3. Based on LSCS design and operating experience, loss of material and increased resistance of connection are not applicable aging effects for LSCS switchyard bus and connections. In scope switchyard bus and connections comprised of aluminum and stainless steel in an air – outdoor environment are not subject to wind induced abrasion nor oxidation or loss of pre-load. For more information see LRA Section 3.6.2.2.3.

4. Based on LSCS design and operating experience, loss of material is not an applicable aging effect for LSCS transmission conductors. In scope LSCS transmission conductors comprised of aluminum and steel in an air – outdoor environment are not subject to wind induced abrasion. For more information see LRA Section 3.6.2.2.3.

Table 3.6.2-1 Electrical Commodities (Continued)

Plant Specific Notes: (continued)

5. Based on LSCS design and operating experience, loss of conductor strength is not an applicable aging effect for LSCS transmission conductors. In scope LSCS transmission conductors comprised of aluminum and steel in an air – outdoor environment are not subject to corrosion. For more information see LRA Section 3.6.2.2.3.

6. Based on LSCS design and operating experience, increased resistance of connection is not an applicable aging effect for LSCS transmission connectors. In scope LSCS transmission connectors comprised of stainless steel in an air – outdoor environment are not subject to oxidation or loss of pre-load. For more information see LRA Section 3.6.2.2.3.

4.0 TIME-LIMITED AGING ANALYSES

4.1 IDENTIFICATION AND EVALUATION OF TIME-LIMITED AGING ANALYSES

Pursuant to 10 CFR 54.3, time-limited aging analyses (TLAAs) are those licensee calculations and analyses that:

1. Involve systems, structures, and components within the scope of license renewal;
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; and
6. Are contained or incorporated by reference in the current licensing basis (CLB).

4.1.1 IDENTIFICATION OF LSCS TIME-LIMITED AGING ANALYSES

TLAAs have been identified for LSCS using methods consistent with those provided in NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP) and with 10 CFR 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

A list of potential generic TLAAs was assembled from the SRP, industry guidance, and experience, including:

- NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants"
- NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report"
- NEI 95-10, Revision 6, "Industry Guideline for Implementing the Requirements of 10 CFR 54, the License Renewal Rule"
- The 10 CFR 54 Final Rule “Statement of Considerations”
- Prior license renewal applications, NRC Requests for Additional Information and NRC Safety Evaluation Reports for these applications.

CLB and design basis documentation was searched to identify potential TLAAs. The document search included the following:

- Updated Final Safety Analysis Report (UFSAR)
- Technical Specifications and Bases
- Docketed licensing correspondence
- NRC Safety Evaluation Reports (SERs)
- Combustion Engineering and Chicago Bridge and Iron design analyses and reports
- General Electric and General Electric Hitachi design analyses and reports
- Sargent and Lundy and other vendor design analyses and reports
- Passport records
- Environmental Qualification Binders
- Specifications
- Engineering Change Requests
- Corrective Action Program Reports
- Self-Assessment Reports
- 10 CFR 50.12 Exemption Requests
- Inspection Relief Requests

Each potential TLAA was reviewed against the six 10 CFR 54.3(a) criteria. Those that meet all six criteria were identified as TLAAs that require evaluation for the period of extended operation.

Table 4.1-1 lists the example TLAAs provided in NUREG-1800, Tables 4.1-2 and 4.1-3 and specifies whether or not these have been identified as TLAAs for LSCS. Those with a "Yes" entry apply for LSCS. The LRA section where they are evaluated is provided. Those with a "No" entry do not apply for LSCS. No TLAA was identified for these categories either because they are associated with design features not employed at LSCS or because no analysis was identified that meet all six TLAA criteria.

4.1.2 EVALUATION OF LSCS TIME-LIMITED AGING ANALYSES

Each LSCS TLAA has been evaluated. Each evaluation contains the following information:

TLAA Description: A description of the CLB analysis that has been identified as a TLAA, including a description of the aging effect evaluated, the time-limited variable used in the analysis, and its basis.

TLAA Evaluation: An evaluation of the TLAA for the period of extended operation. This section provides information associated with 60 years of operation for comparison with the information used in the TLAA that considered 40 years of operation. This evaluation will provide the basis for the disposition, which will fall into one of the three disposition categories described below.

TLAA Disposition: The disposition is classified in accordance with one of the acceptance criteria from 10 CFR 54.21(c)(1) specified below in Section 4.1.3.

4.1.3 ACCEPTANCE CRITERIA

10 CFR 54.21, Contents of application – technical information, states that an application must contain the following information:

(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.

One or more of these three methods was used to disposition each TLAA identified for LSCS. The methods used are identified in each TLAA evaluation section.

4.1.4 SUMMARY OF RESULTS

Several categories of TLAAs were identified for LSCS. The TLAAs are grouped by affected component type and aging effect analyzed, as shown in the TLAA Summary in Table 4.1-2, which includes a reference to the applicable LRA section that evaluates each TLAA.

4.1.5 IDENTIFICATION OF EXEMPTIONS PURSUANT TO 10 CFR 50.12

Exemptions currently in effect for LaSalle Unit 1 and Unit 2 pursuant to 10 CFR 50.12 were reviewed and it was determined that none were associated with or supported by TLAAs. Therefore, no further evaluation is required.

Table 4.1-1
GENERIC TLAA APPLICABILITY TO LSCS

NUREG-1800, Table 4.1-2 – Generic Time-Limited Aging Analyses	Applies for LSCS?	LRA Section
Reactor vessel neutron embrittlement (Subsection 4.2)	Yes	4.2
Metal fatigue (Subsection 4.3)	Yes	4.3
Environmental qualification (EQ) of electrical components (Subsection 4.4)	Yes	4.4
Concrete containment tendon prestress (Subsection 4.5)	Yes	4.5
Inservice local metal containment corrosion analyses (Subsection 4.6)	No	No TLAA Identified
NUREG-1800, Table 4.1-3 – Examples of Potential Plant-Specific TLAAs		
Intergranular separation in the heat-affected zone (HAZ) of reactor vessel low-alloy steel under austenitic SS cladding	No	N/A – Meet RG 1.43 guidance
Low-temperature overpressure (LTOP) analyses	No	No TLAA Identified
Fatigue analysis for the main steam supply lines to the turbine driven auxiliary feedwater pumps	No	No TLAA Identified
Fatigue analysis for the reactor coolant pump flywheel	No	No TLAA Identified
Fatigue analysis of polar crane (Reactor Building Crane)	Yes	4.7.1
Flow-induced vibration endurance limit for the reactor vessel internals	No	No TLAA Identified
Transient cycle count assumptions for the reactor vessel internals	Yes	4.3.4
Ductility reduction of fracture toughness for the reactor vessel internals	No	No TLAA Identified
Leak before break	No	No TLAA Identified
Fatigue analysis for the containment liner plate	Yes	4.6.1
Containment penetration pressurization cycles	Yes	4.6.1
Metal Corrosion Allowance	No	No TLAA Identified
High-energy line-break postulation based on fatigue CUF	Yes	4.3.5
Inservice flaw growth analyses that demonstrate structure stability for 40 yrs.	No	No TLAA Identified

TABLE 4.1-2
SUMMARY OF RESULTS - LSCS TIME-LIMITED AGING ANALYSES

TLAA DESCRIPTION	Disposition	LRA SECTION
IDENTIFICATION AND EVALUATION OF TIME-LIMITED AGING ANALYSES (TLAAS)		4.1
Identification of LSCS Time-Limited Aging Analyses		4.1.1
Evaluation of LSCS Time-Limited Aging Analyses		4.1.2
Acceptance Criteria		4.1.3
Summary of Results		4.1.4
Identification of Exemptions to 10CFR50.12 Associated With TLAAs		4.1.5
REACTOR VESSEL AND INTERNALS NEUTRON EMBRITTLEMENT ANALYSES		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
Adjusted Reference Temperature Analyses	§54.21(c)(1)(ii)	4.2.3
Pressure – Temperature Limits	§54.21(c)(1)(iii)	4.2.4
Axial Weld Failure Probability Assessment Analyses	§54.21(c)(1)(ii)	4.2.5
Circumferential Weld Failure Probability Assessment Analyses	§54.21(c)(1)(iii)	4.2.6
Reactor Pressure Vessel Reflood Thermal Shock Analyses	§54.21(c)(1)(ii)	4.2.7
RPV Core Plate Rim Hold-Down Bolt Loss of Preload Analysis	§54.21(c)(1)(i)	4.2.8
Jet Pump Riser Brace Clamp Loss of Preload Analysis	§54.21(c)(1)(i)	4.2.9
Jet Pump Slip Joint Repair Clamp Loss of Preload Analysis	§54.21(c)(1)(iii)	4.2.10
METAL FATIGUE ANALYSES		4.3
ASME Section III, Class 1 Fatigue Analyses	§54.21(c)(1)(iii)	4.3.1
ASME Section III, Class 2 and 3 and ANSI B31.1 Allowable Stress Analyses	§54.21(c)(1)(i)	4.3.2
Environmental Fatigue Analyses for RPV and Class 1 Piping	§54.21(c)(1)(iii)	4.3.3
Reactor Vessel Internals Fatigue Analyses	§54.21(c)(1)(iii)	4.3.4
High-Energy Line Break (HELB) Analyses Based On Fatigue	§54.21(c)(1)(iii)	4.3.5
Main Steam Relief Valve Discharge Piping Fatigue Analysis	§54.21(c)(1)(i)	4.3.6
ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC COMPONENTS		4.4
Environmental Qualification (EQ) of Electric Components	§54.21(c)(1)(iii)	4.4.1
CONCRETE CONTAINMENT TENDON PRESTRESS ANALYSES		4.5
Concrete Containment Tendon Prestress Analyses	§54.21(c)(1)(iii)	4.5.1
PRIMARY CONTAINMENT FATIGUE ANALYSES		4.6
Primary Containment Liner and Penetrations Fatigue Analyses	§54.21(c)(1)(iii)	4.6.1
Primary Containment Refueling Bellows Fatigue Analysis	§54.21(c)(1)(i)	4.6.2
Primary Containment Downcomer Vents Fatigue Analysis	§54.21(c)(1)(i)	4.6.3
OTHER PLANT-SPECIFIC ANALYSES		4.7
Reactor Building Crane Cyclic Loading Analysis	§54.21(c)(1)(i)	4.7.1
Main Steam Line Flow Restrictors Erosion Analysis	§54.21(c)(1)(ii)	4.7.2

4.2 REACTOR VESSEL AND INTERNALS NEUTRON EMBRITTLEMENT ANALYSES

10 CFR 50.60 requires that all light-water reactors meet the fracture toughness, P-T limits, and material surveillance program requirements for the reactor coolant pressure boundary as set forth in 10 CFR 50, Appendices G and H. The ferritic materials of the reactor pressure vessel are subject to embrittlement due to high energy (E > 1.0 MeV) neutron exposure. Embrittlement means the material has lower toughness (i.e., will absorb less strain energy during a crack or rupture), thus allowing a crack to propagate more easily under thermal and pressure loading. Neutron embrittlement analyses are used to account for the reduction in fracture toughness associated with the cumulative neutron fluence (total number of neutrons that intersect a square centimeter of component area during the life of the plant).

Toughness (indirectly measured in foot-pounds of absorbed energy in a Charpy impact test) is temperature dependent in ferritic materials. An initial nil-ductility reference temperature (RT_{NDT}) is associated with the transition from ductile to brittle behavior and is determined for vessel materials through a combination of Charpy and drop-weight testing. Toughness increases with temperature up to a maximum value called the “upper-shelf energy,” or USE. Neutron embrittlement results in a decrease in the USE of reactor pressure vessel steels. This means higher temperatures are required for the material to behave in a ductile manner than were required before embrittlement.

To reduce the potential for brittle fracture during reactor pressure vessel operation, changes in material toughness as a function of neutron radiation exposure (fluence) are accounted for through the use of operating pressure-temperature (P-T) limits that are included in the LSCS Technical Specifications. The P-T limits account for the decrease in material toughness of the reactor pressure vessel beltline materials associated with a given fluence. The beltline region includes the reactor vessel plates, welds and forging materials that are predicted to receive a cumulative neutron exposure of 1.0E+17 (1.0×10^{17}) neutrons/cm^2 during the licensed life of the plant. Since the cumulative neutron fluence will increase during the period of extended operation, a review is required to determine if any additional components will exceed the threshold value and require evaluation for neutron embrittlement.

Based on the projected drop in toughness for each beltline material as a result of exposure to the predicted fluence values, upper-shelf energy calculations are performed to determine if the components will continue to have adequate fracture toughness at the end of license to meet the required minimums. P-T limit curves are generated to provide minimum temperature limits that must be achieved during operations prior to application of specified reactor pressure vessel pressures. The P-T limit curves are based, in part, upon Adjusted Reference Temperature (ART) values for each material located within the beltline region of the reactor vessel. The ART value is computed using the initial RT_{NDT} (nil-ductility temperature) and ΔRT_{NDT} (change in nil-ductility temperature due to fluence) computed for the licensed operating period, along with appropriate margins.

The reactor pressure vessel material ART and USE values, calculated on the basis of neutron fluence, as well as the P-T limit curves based on the ART values, are part of the licensing basis and support safety determinations and therefore have been identified as TLAAs. The increases in RT_{NDT} (ΔRT_{NDT}) also affect the bases for relief from circumferential weld inspection and the supporting calculation of limiting axial weld conditional failure probability. Therefore, these calculations have been identified as TLAAs. Several reactor vessel internal components, including jet pump repair hardware components and core plate rim hold-down bolts have been analyzed for loss of preload due to neutron fluence for 40 years and have therefore been identified as TLAAs.

The 60-year neutron embrittlement evaluations are based on the most current materials data, including the most recent surveillance data applicable to Unit 1. In addition, the 60-year neutron embrittlement evaluations are based on new RAMA fluence projections valid from initial plant startup through the end of the period of extended operation, described in Section 4.2.1. The following TLAAs related to neutron fluence are evaluated in the LRA subsections listed below:

- Neutron Fluence Analyses (4.2.1)
- Upper-Shelf Energy Analyses (4.2.2)
- Adjusted Reference Temperature Analyses (4.2.3)
- Pressure – Temperature Limits (4.2.4)
- Axial Weld Failure Probability Assessment Analyses (4.2.5)
- Circumferential Weld Failure Probability Assessment Analyses (4.2.6)
- Reactor Pressure Vessel (RPV) Reflood Thermal Shock Analyses (4.2.7)
- RPV Core Plate Rim Hold-down Bolt Loss of Preload Analysis (4.2.8)
- Jet Pump Riser Brace Clamp Loss of Preload Analysis (4.2.9)
- Jet Pump Slip Joint Repair Clamp Loss of Preload Analysis (4.2.10)

4.2.1 NEUTRON FLUENCE ANALYSES

TLAA Description:

Neutron fluence is the term used to represent the cumulative number of neutrons per square centimeter that contact the reactor vessel shell and its internal components over a given period of time. The fluence projections that quantify the number of neutrons that contact these surfaces have been used as inputs to the neutron embrittlement analyses that evaluate the loss of fracture toughness aging effect resulting from neutron fluence.

The fluence projections used as inputs to the current 40-year neutron embrittlement analyses for LSCS Units 1 and 2 were developed in accordance with GE Licensing Topical Report NEDC-32983P, which was approved by the NRC in a SER dated September 14, 2001 and which is in compliance with NRC Regulatory Guide 1.190 (Reference 4.8.1). The projections predict the neutron fluence expected for 32 Effective Full Power Years (EFPY) of plant operation. At the time the projections were prepared, 32 EFPY was considered to represent the amount of power to be generated over 40 years of plant operation, assuming a 40-year average capacity factor of 80 percent.

A 1.7 percent power uprate was implemented at the beginning of Cycle 14 for each unit, and as part of the evaluation of the uprates, the initial 32 EFPY fluence values described above were conservatively scaled up by 2 percent. The resulting peak inside-surface fluence value (at the clad-base metal interface) for Unit 1 is 1.04E+18 n/cm^2 and is 1.112E+18 n/cm^2 for Unit 2. These adjusted fluence values were used as inputs in the current (40-year) neutron embrittlement analyses, including Adjusted Reference Temperature (ART) calculations, Upper-Shelf Energy (USE) calculations, Pressure-Temperature (P-T) Limits, Axial Weld Failure Probability calculations, and Circumferential Weld Failure Probability calculations that are evaluated in LRA Sections 4.2.2, 4.2.3, 4.2.4, 4.2.5, and 4.2.6, respectively. These adjusted fluence projections have been identified as TLAAs requiring evaluation for the period of extended operation.

TLAA Evaluation:

Fluence projections, valid for 60 years of operation, were developed for the Unit 1 and Unit 2 beltline materials that are used as inputs in updated neutron embrittlement evaluations for license renewal. These 60-year Radiation Analysis Modeling Application (RAMA) fluence projections compile the cumulative fluence resulting from each past operating cycle and add the predicted fluence estimated for future operating cycles through the period of extended operation. The RAMA fluence projections are prepared using the methodology and computer software described in BWRVIP-126 (Reference 4.8.3). These 60-year fluence projections are independent from the fluence projections used within the current P-T curve submittals. The first step in updating fluence projections from 40 years to 60 years was to update the Effective Full Power Year (EFPY) projections, based upon past power history records, including capacity factors, and upon updated fuel design and power production data used to predict future power generation. The information used to develop these EFPY projections updated for 60 years is summarized below.

Effective Full Power Year (EFPY) Projections

Unit 1 started commercial operation with a licensed thermal power of 3323 MWt and operated with that maximum power level during cycles 1 through part of cycle 9. The cumulative EFPY through the middle of cycle 9 was 9.7 EFPY. A 5 percent power rerate to 3489 MWt was implemented for Unit 1 at that time and the plant continued to operate with the 3489 MWt maximum power level through part of cycle 14, when the cumulative EFPY was 20.8. A further 1.7 percent power uprate to 3546 MWt was achieved on 9/26/2010 during cycle 14. The power history shows that Unit 1 had operated for 22.7 EFPY through the end of cycle 15 in 2014.

Unit 2 started commercial operation with a licensed thermal power of 3323 MWt and operated with that maximum power level during cycles 1 through part of cycle 8, when the cumulative EFPY was approximately 9.6. A five percent power rerate to 3489 MWt was implemented for Unit 2 at that time and the plant continued operating at that maximum power level through cycle 13, when the cumulative EFPY was 19.2. A 1.7 percent power uprate to 3546 MWt was achieved at the beginning of cycle 14. The power history shows that Unit 2 had operated for 23.1 EFPY through the end of cycle 15.

The 60-year EFPY projections are based upon a maximum power level of 3546 MWt. Future operating cycles are assumed to include 715 days of full power operation every two years (i.e. 24-month cycles with 15 outage days and no downpowers assumed). For Units 1 and 2, this results in the accumulation of less than 54 EFPY at the end of 60 years of operation.

Fluence Projections

High energy (>1 MeV) neutron fluence was calculated for the RPV beltline welds and shells using the Radiation Analysis Modeling Application (RAMA) fluence methodology. RAMA was developed for the Electric Power Research Institute and the Boiling Water Reactor Vessel and Internals Project. The NRC has reviewed and approved RAMA for BWR RPV fluence predictions (References 4.8.2, 4.8.18, and 4.8.19). RAMA was used to develop 60-year, 54 EFPY fluence values for Unit 1 and Unit 2. Use of this methodology for evaluations of fluence for LSCS was performed in accordance with guidelines presented in NRC Regulatory Guide 1.190 (Reference 4.8.1). The 54 EFPY fluence projections were used in the evaluation of the neutron embrittlement TLAAs.

10 CFR 50, Appendix G, defines the beltline region of the RPV as the region of the reactor vessel that directly surrounds the effective height of the active core and adjacent regions of the reactor vessel that are predicted to experience sufficient neutron irradiation to be considered in the selection of the most limiting material with regard to radiation damage. In order to establish the threshold value of neutron irradiation for identification of beltline materials, 10 CFR 50, Appendix H, defines a fluence value of 1.0E+17 n/cm^2.

32 EFPY and 54 EFPY RAMA fluence projections were developed for all reactor vessel beltline materials. The 54 EFPY fluence projections were used to evaluate reactor vessel fracture toughness for the period of extended operation, as described in LRA subsections 4.2.2 and 4.2.3. 32 EFPY and 54 EFPY RAMA fluence projections were also developed for specific reactor vessel internals components, both to evaluate fluence-based TLAAs and to predict when specified fluence threshold values will be reached that are used to invoke specific aging management requirements for these components, such as inspections.

Each of the LSCS fluence projection models are based upon quadrant azimuthal symmetry, which means one quarter of the reactor core was modeled in detail to provide an accurate representation of the core configuration. The models also include accurate geometric representations of the reactor pressure vessel, including the N12 Water Level Instrumentation (WLI) nozzles and the N6 Low Pressure Coolant Injection (LPCI) nozzles, which are included in the reactor vessel beltline. In addition, the N2 Recirculation Inlet nozzles were modeled, but the 60-year fluence projections for these nozzles was below the threshold value of 1.0E+17 n/cm^2 so these nozzles are not considered to be within the beltline. The reactor pressure vessel fluence values were determined at the interface of the RPV base metal and cladding (0T) for the RPV beltline materials as well as at the 1/4T locations, defined as 1/4 of the way through the vessel wall from the inside surface at the clad/base metal interface.

The Unit 1 reactor pressure vessel was fabricated by Combustion Engineering, and the beltline includes the following components as shown in Figure 4.2.1-1: lower shell plates and axial welds, lower-intermediate shell plates and axial welds, middle shell plates and axial welds, the circumferential weld between the lower shell and the lower-intermediate shell, the circumferential weld between the lower-intermediate shell and the middle shell, the N12 WLI nozzles and welds, and the N6 LPCI nozzles and welds.

The Unit 2 reactor pressure vessel was fabricated by Chicago Bridge and Iron Co., and the beltline includes the following components as shown in Figure 4.2.1-2: lower shell plates and axial welds, the lower-intermediate shell plates and axial welds, the circumferential weld between the lower shell and the lower-intermediate shell, the N12 WLI nozzles and welds, and the N6 LPCI nozzles and welds.

The N12 WLI nozzles and welds are fabricated from nickel-alloy materials that are not required to be evaluated for loss of fracture toughness by 10 CFR 50, Appendix G, since they are not ferritic materials. However, the Pressure-Temperature (P-T) curves must address the plate material at the location of the N12 nozzles to account for the stresses due to the discontinuity and to account for loss of fracture toughness due to neutron fluence. Therefore, fluence projections are provided for this location. The N6 LPCI nozzle forgings and welds are fabricated from low alloy steel and must be evaluated for loss of fracture toughness. Reactor pressure vessel 1/4T fluence values were then determined for each beltline component using the dpa (displacement-per-atom) method permitted by Regulatory Guide 1.99, Revision 2. This method substitutes the ratio of dpa at the 1/4T depth to the dpa at the 0T depth in place of the exponential attenuation factor in Equation 3 from the Regulatory Guide. The thickness value, T, is the minimum wall thickness specified for the beltline region of each RPV, which is 6.125 inches for the middle shell and lower-intermediate shell of Unit 1 and is 7.125 inches for the lower shell. The plant-specific 1/4T fluence values obtained using this method were used in evaluating the neutron fluence-related TLAAs, as described in the remainder of Section 4.2.

Table 4.2.1-1 shows the fluence projections for Unit 1 reactor vessel beltline shells plates. Table 4.2.1-2 shows the fluence projections for Unit 1 circumferential (horizontal) welds and axial (vertical) welds. Table 4.2.1-3 shows the fluence projections for Unit 1 beltline nozzle forgings. Table 4.2.1-4 shows the fluence projections for Unit 2 reactor vessel beltline shell plates. Table 4.2.1-5 shows the fluence projections for Unit 2 circumferential welds and axial welds. Table 4.2.1-6 shows the fluence projections for Unit 2 beltline nozzle forgings.

RAMA fluence projections were also developed for several reactor vessel internals components and jet pump repair hardware. The jet pump repair hardware design analyses include allowances for loss of preload due in part to stress relaxation of the clamping components due to radiation exposure. In order to determine the cumulative neutron fluence these components will experience through the period of extended operation, the RAMA fluence models for each unit include these components and projections were made for the fluence expected during each component's service life. Since these repair components were installed in recent years, their service life is less than 60 years. For each repair component evaluated, the fluence projection is based upon the longest actual service life possible for the particular component type.

The basis for acceptability of using RAMA fluence projections for RV internals components is provided below:

The NRC Safety Evaluation of Proprietary EPRI Reports, "BWRVIP RAMA Fluence Methodology Manual (BWRVIP-114)," "RAMA Fluence Methodology Benchmark Manual (BWRVIP-115)," "RAMA Fluence Methodology – Susquehanna Unit 2 Surveillance Capsule Fluence Evaluation for Cycles 1-5 (BWRVIP-117)," and "RAMA Fluence Methodology Procedures Manual (BWRVIP-121)" and "Hope Creek Flux Wire Dosimeter Activation Evaluation for Cycle 1 (TWE-PSE-001-R-001)" (TAC No. MB9765), dated May 13, 2005 (Reference 4.8.2), evaluated the use of RAMA fluence methodology for BWR reactor pressure vessel (RPV) and internal components of BWR plants.

Section 4.2 of the SER to BWRVIP-114, 115, 117, and 121 states that: "the submittal does not include any benchmarking for reactor internals' neutron fluence calculations." Therefore, the staff will review qualification of RAMA for reactor internals applications on a case-by-case basis, based on consideration of C/M values and the associated accuracy requirements." It further states that "Licensees who wish to use the RAMA methodology for the calculation of neutron fluence at reactor internals locations must reference, or provide, an analysis which adequately benchmarks the use of the RAMA methodology for uncertainty and calculational bias based on the consideration of: (1) the location at which the neutron fluence is being calculated, (2) the geometry of the reactor, and (3) the accuracy required for the evaluation. In addition, if a licensee qualifies RAMA for calculating, for example, helium generation at one location (e.g. the core shroud), this qualifies RAMA for the same reactor and purpose at other reactor internals locations (e.g. at the location of the jet pumps)."

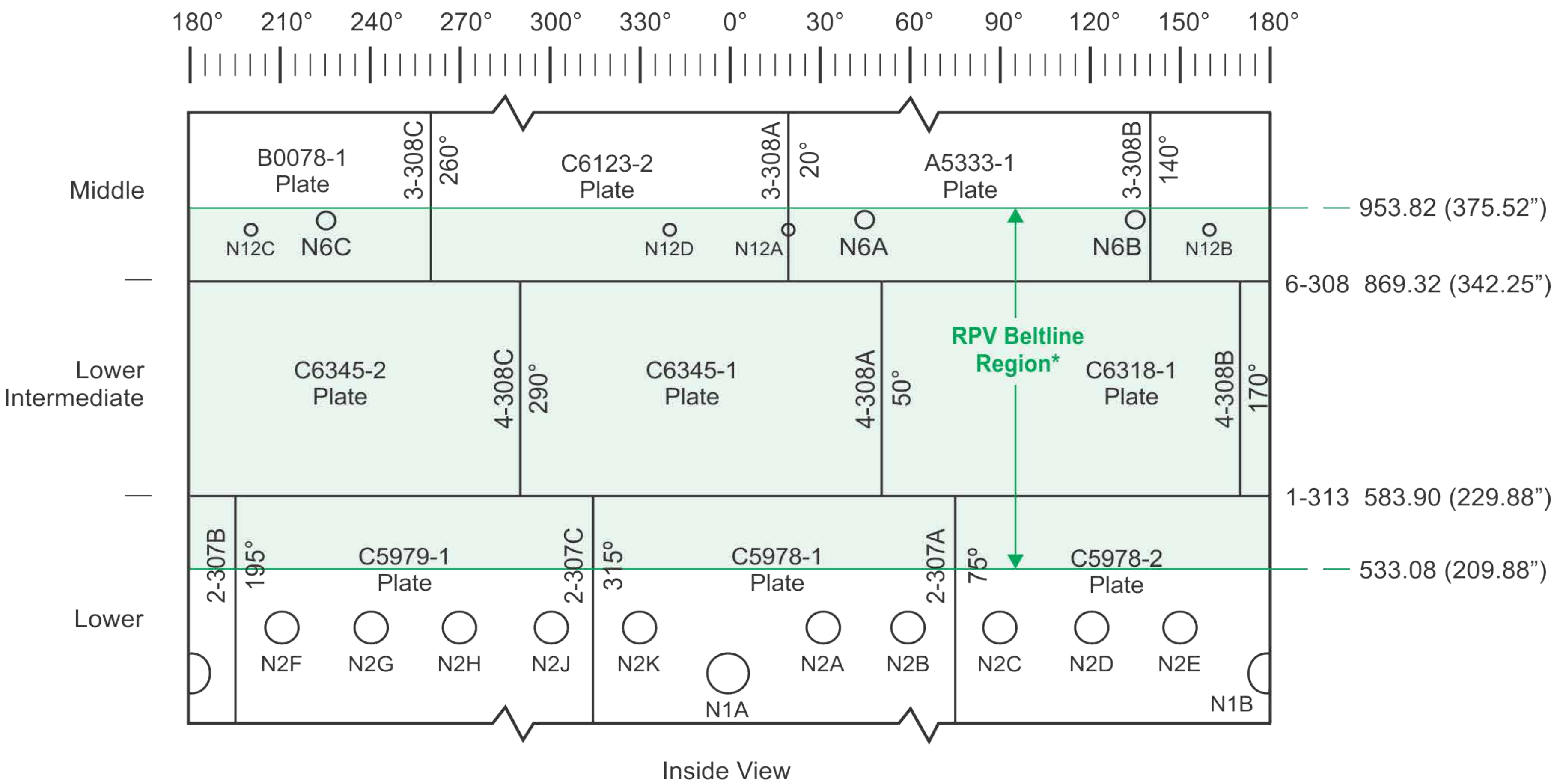
The BWRVIP-145 report, "BWR Vessel and Internals Project, Evaluation of Susquehanna Unit 2 Top Guide and Core Shroud Material Samples Using RAMA Fluence Methodology (ML 100260948)," was submitted to the NRC for the purpose of supporting generic regulatory improvements in order to enable the evaluation of reactor internal component degradation by providing a methodology to determine fast neutron fluence values for BWR internal components. The BWRVIP-145 report was based upon using RAMA fluence methodology to calculate reactor internals fluence values. The methodology was applied to core shroud and top guide samples removed from Susquehanna Unit 2 after 11 cycles of irradiation. The report compares the actual dosimetry results from the Susquehanna samples with the corresponding RAMA fluence values (References 4.8.19 and 4.8.20).

The staff reviewed the BWRVIP-145 report for its suitability in applying the RAMA fluence methodology to calculation of fast neutron fluence values for BWR reactor vessel internals, specifically for the core shroud and top guide (References 4.8.19 and 4.8.20). The staff concluded for the core shroud comparison that "the calculated values are in excellent agreement with the measured values, thus, the RAMA fluence methodology in this particular case performs very well." The staff concluded that "the calculated values for the top guide dosimetry are in reasonable agreement with the measured values and that the results are acceptable for determining fast neutron fluence values in the core shroud and top guide."

The staff further concluded that although the benchmarking guidance in RG1.190 was not achieved, there is reasonable agreement between the calculated and measured dosimetry values of the limited data provided. Therefore, the staff found that for applications related to IASCC, crack propagation rates, and weldability determinations, the existing data provides adequate justification for applying the RAMA methodology to determine the fast neutron fluence values in the core shroud and top guide.

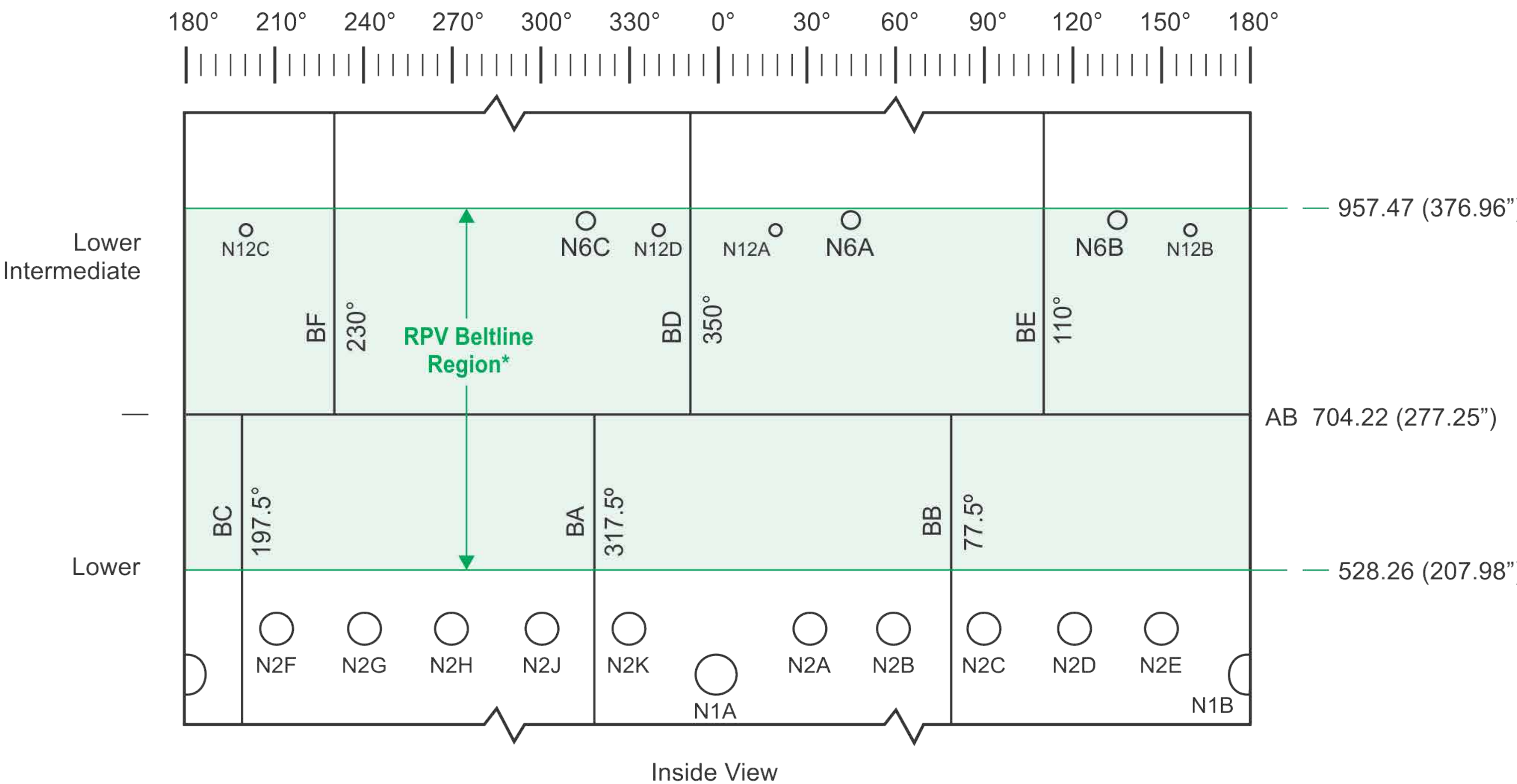
Therefore, the BWRVIP-145 report is referenced for satisfying the requirements specified in the SER for BWRVIP-114, -115, -117, and -121 with respect to using the RAMA fluence methodology to predict fast neutron fluence for core shroud, top guide, and jet pump locations in determining the extent of loss of preload as a function of neutron fluence. LaSalle Unit 1 and Unit 2 are BWR-5 reactors similar to the BWR/4 design of Susquehanna Unit 2, with 251-inch inside diameter reactors, 764 fuel bundles, and core shrouds with a 207-inch outside diameter. Therefore, since the RAMA methodology may be used at Susquehanna for core shroud and top guide applications, it may also be used at LaSalle for reactor internals applications, including determination of fast neutron fluence for the jet pumps, as provided in the SER for BWRVIP-114, -115, -117, and -121.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) – The fluence analyses have been projected through the period of extended operation. They are to be used as inputs in the neutron embrittlement TLAA evaluations in the remainder of Section 4.2.



Notes: This drawing is not to scale.
Dimensions are given in centimeters (inches).
* RPV beltline region is shown for 54 EFPY.

Figure 4.2.1-1 – LSCS Unit 1 - Combustion Engineering Reactor Vessel - Beltline Components



Notes: This drawing is not to scale.
Dimensions are given in centimeters (inches).
* RPV beltline region is shown for 54 EFPY.

Figure 4.2.1-2 – LSCS Unit 2 - Chicago Bridge and Iron Reactor Vessel - Beltline Components

Table 4.2.1-1 LSCS Unit 1 - Maximum Neutron Fluence (>1.0 MeV) in RPV Beltline Shell Plates at 54 EFPY (n/cm^2)			
Plate No.	**Heat Number**	**0T**	**1/4T**
Unit 1 Lower Shell Assembly 307-04 Plates:			
G-5603-1	C5978-1	3.75E+17	2.64E+17
G-5603-2	C5978-2	3.75E+17	2.64E+17
G-5603-3	C5979-1	3.75E+17	2.64E+17
Unit 1 Lower-Intermediate Shell Assembly 308-06			
G-5604-1	C6345-1	1.06E+18	7.41E+17
G-5604-2	C6318-1	1.06E+18	7.41E+17
G-5604-3	C6345-2	1.06E+18	7.41E+17
Unit 1 Middle Shell Assembly 308-05			
G-5605-1	A5333-1	9.01E+17	6.28E+17
G-5605-2	B0078-1	9.01E+17	6.28E+17
G-5605-3	C6123-2	9.01E+17	6.28E+17

Table 4.2.1-2
LSCS Unit 1 - Maximum Neutron Fluence (>1.0 MeV) in RPV Beltline Welds at 54 EFPY (n/cm^2)

Weld No.	Heat / Lot Number	0T	1/4T
Unit 1 Lower Shell Axial Welds:			
2-307 A, B, C	21935/3889	3.27E+17	2.30E+17
2-307 A, B, C	12008/3889	3.27E+17	2.30E+17
2-307 A, B, C	21935 & 12008 tandem	3.27E+17	2.30E+17
Unit 1 Lower-Intermediate Shell Axial Welds:			
4-308 A, B, & C	305414/3497	1.00E+18	7.03E+17
4-308 A, B, & C	12008/3947	1.00E+18	7.03E+17
4-308 A, B, & C	305414 & 12008 tandem	1.00E+18	7.03E+17
Unit 1 Middle Shell Axial Welds:			
3-308 A, B, & C	305424/3889	8.66E+17	6.04E+17
3-308 A, B, & C	1P3571/3958	8.66E+17	6.04E+17
Unit 1 Lower Intermediate-to-Lower Shell Circumferential Weld			
6-308	6329637	9.01E+17	6.28E+17
Unit 1 Middle-to-Lower Intermediate Shell Circumferential Weld:			
1-313	4P6519	3.75E+17	2.64E+17

Table 4.2.1-3 LSCS Unit 1 - Maximum Neutron Fluence (>1.0 MeV) in RPV Beltline Nozzles at 54 EFPY (n/cm^2)			
Nozzle Location	**Heat Number**	**0T**	**1/4T**
Unit 1 N6 Low Pressure Coolant Injection (LPCI) Nozzles and Welds:			
N6 Nozzle Forging Blend Radius	Q2Q22W	1.55E+17	1.37E+17
N6 Nozzle Weld	ABEA	4.63E+17	3.12E+17
N6 Nozzle Weld	FAGA	4.63E+17	3.12E+17
N6 Nozzle Weld	CCJA	4.63E+17	3.12E+17
N6 Nozzle Weld	FOAA	4.63E+17	3.12E+17
N6 Nozzle Weld	EAIB	4.63E+17	3.12E+17
Unit 1 N12 Water Level Instrumentation (WLI) Nozzles and Welds:			
N12 Nozzle Forging	N/A (note 1)	2.86E+17	2.35E+17
N12 Nozzle Weld	N/A (note 1)	N/A	N/A

Note 1: N12 nozzle forgings and welds are fabricated from Nickel Alloy 600 material which does not require evaluation of loss of fracture toughness. The 1/4T fluence value for the N12 nozzle location along the extraction path is to be used in conjunction with the material properties of this ferritic plate material to determine the Adjusted Reference Temperature applicable for the nozzle location.

Table 4.2.1-4
LSCS Unit 2 - Maximum Neutron Fluence (>1.0 MeV) in RPV Beltline Shell Plates (n/cm^2)

Shell	Heat Number	0T	1/4T
Unit 2 Lower Shell Assembly Plates:			
21-1	C9425-2	1.06E+18	7.41E+17
21-2	C9425-1	1.06E+18	7.41E+17
21-3	C9434-2	1.06E+18	7.41E+17
Unit 2 Lower-Intermediate Shell Assembly Plates:			
22-1	C9481-1	1.22E+18	8.52E+17
22-2	C9404-2	1.22E+18	8.52E+17
22-3	C9601-2	1.22E+18	8.52E+17

Table 4.2.1-5 LSCS Unit 2 - Maximum Neutron Fluence (>1.0 MeV) in RPV Beltline Welds at 54 EFPY (n/cm^2)			
Weld No.	**Heat/Lot Number**	**0T**	**1/4T**
Unit 2 Lower Shell Axial Welds:			
BA, BB, & BC	3P4000/3933	9.26E+17	6.50E+17
Unit 2 Lower-Intermediate Shell Axial Welds:			
BD, BE, & BF	3P4966/1214	1.14E+18	8.02E+17
Unit 2 Lower-to-Lower-Intermediate Shell Circumferential Weld:			
AB	5P6771/0342	1.06E+18	7.41E+17

Table 4.2.1-6
LSCS Unit 2 - Maximum Neutron Fluence (>1.0 MeV) in RPV Beltline Nozzles and Welds at 54 EFPY (n/cm^2)

Nozzle No. / Location	Heat/Lot Number	0T	1/4T
Unit 2 N6 LPCI Nozzles and Welds:			
N6 Nozzle Forging Blend Radius	Q2Q36W	1.85E+17	1.53E+17
N6 Nozzle Weld	C3L46C/J0202A27A	5.36E+17	3.61E+17
N6 Nozzle Weld single wire	3P4966/1214/3482	5.15E+17	3.61E+17
N6 Nozzle Weld tandem wire	3P4966/1214/3482	5.15E+17	3.61E+17
N6 Nozzle Weld	05P018/D211A27A	5.15E+17	3.61E+17
N6 Nozzle Weld	04P046/D217A27A	5.15E+17	3.61E+17
Unit 2 N12 WLI Nozzles and Welds:			
N12 Nozzle Forging	N/A (note 1)	3.24E+17	2.72E+17
N12 Nozzle Weld	N/A (note 1)	N/A	N/A

Note 1: N12 nozzle forgings are fabricated from Nickel Alloy 600 material which does not require evaluation of loss of fracture toughness. The 1/4T fluence value for the N12 nozzle location along the extraction path is to be used in conjunction with the material properties of this ferritic plate material to determine the Adjusted Reference Temperature applicable for the nozzle location.

4.2.2 UPPER-SHELF ENERGY ANALYSES

TLAA Description:

The current licensing basis Charpy Upper-Shelf Energy (USE) calculations were prepared for LSCS Unit 1 and Unit 2 reactor vessel beltline materials for 32 EFPY. Since the USE value is a function of 32 EFPY fluence, associated with the 40-year licensed operating period, these USE calculations meet the criteria of 10 CFR 54.3(a) and have been identified as TLAAs requiring evaluation for 60 years.

TLAA Evaluation:

Appendix G of 10 CFR 50, Paragraph IV.A.1.a, states that reactor vessel beltline materials must have Charpy upper-shelf energy of no less than 75 ft-lb initially and must maintain Charpy upper-shelf energy (USE) throughout the life of the vessel of no less than 50 ft-lb, unless it is demonstrated in a manner approved by the Director, Office of Nuclear Reactor Regulation, that lower values of Charpy upper-shelf energy will provide margins of safety against fracture equivalent to those required by Appendix G of Section XI of the ASME Code.

As described in Section 4.2.1, 54 EFPY 1/4T fluence values were determined for LSCS Unit 1 and 2 beltline materials using the dpa attenuation method specified in Regulatory Guide 1.99, Revision 2. The 1/4T fluence value for each location was used to update USE values for 54 EFPY based upon methods consistent with Regulatory Guide 1.99, Revision 2. Table 4.2.2-1 and 4.2.2-2 summarize the 54 EFPY USE calculations for Unit 1 and Unit 2, respectively.

The 54 EFPY USE values for Unit 1 and 2 beltline materials were determined to remain within the limits of 10 CFR 50 Appendix G requirements by having End-of-License (EOL) USE values of at least 50 ft-lb.

10 CFR 50, Appendix G, only requires evaluation of USE for reactor vessel beltline ferritic materials. The N12 Water Level Instrument nozzle welds are fabricated from nickel alloy 600, which is not a ferritic material. However, the surrounding Lower-Intermediate Shell plate is evaluated for USE at this location using the fluence at the 1/4T location along the limiting pressure stress cross-section extraction path, as shown in Figure 4.2.2-1. The nickel alloy nozzle welds do not require evaluation.

The ferritic N6 LPCI nozzle forgings and the nozzle-to-shell welds were evaluated for USE at the 1/4T location along the limiting pressure stress cross-section extraction paths, as shown in Figure 4.2.2-2. The N6 nozzle forgings and nozzle-to-shell welds have been demonstrated to maintain over 50 ft-lb of USE at 54 EFPY.

Figure 4.2.2-1 - N12 Water Level Instrumentation Nozzle Extraction Path

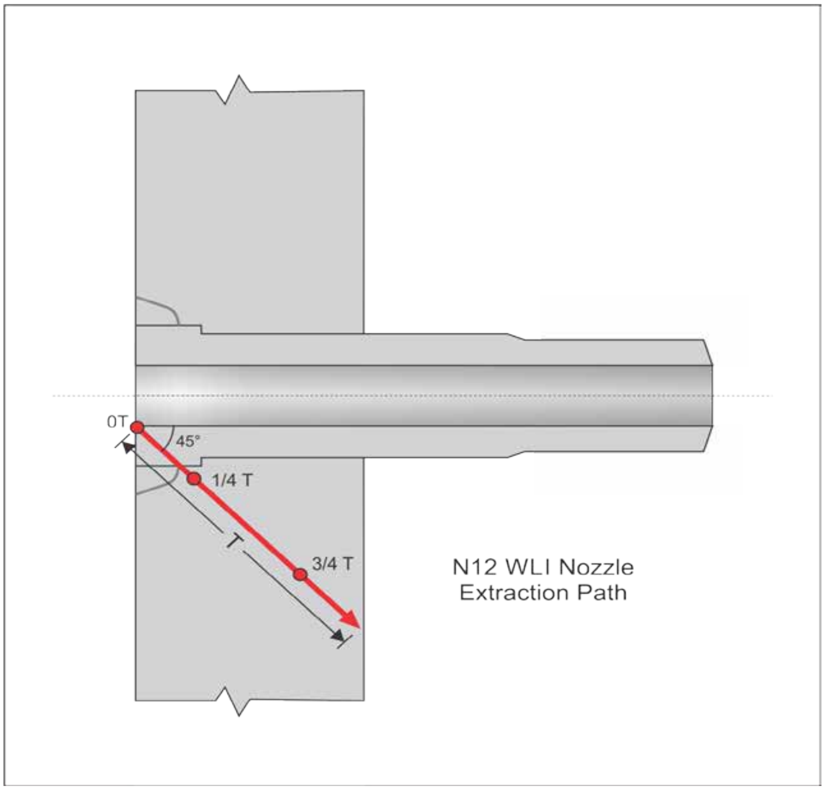
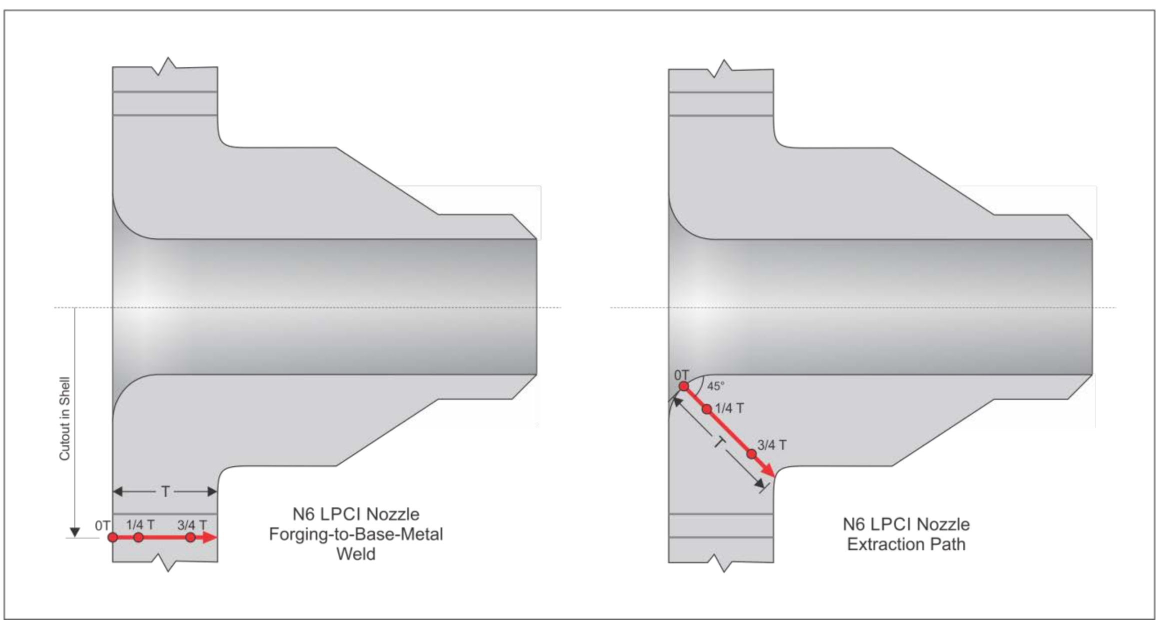


Figure 4.2.2-2 - N6 LPCI Nozzle-to-Shell Weld and Nozzle Forging Extraction Paths



There are additional 54 EFPY USE values reported in Tables 4.2.2-1 and 4.2.2-2 beyond those for the beltline materials described above. LSCS participates in the BWR Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP), as described in Reactor Vessel Surveillance (B.2.1.20) aging management program. The BWRVIP ISP was established as a program that combines surveillance materials from the existing BWR surveillance programs with materials from the Supplemental Surveillance Program to provide sufficient material data to improve compliance with 10 CFR 50 Appendix H. The data from all BWR surveillance programs has been evaluated to select the “best-estimate” chemistry values to be used to represent each heat of material. As part of the ISP, a LaSalle plant-specific capsule was removed and tested in 2011, as described in BWRVIP Letter 2011-206, *Project No. 704 – BWRVIP-250NP: BWR Vessel and Internals Project, Testing and Evaluation of the LaSalle Unit 1 120º Surveillance Capsule,* dated November 18, 2011 (Reference 4.8.5). This provided new irradiated material property information for the Unit 1 limiting weld heat 1P3571. The upper-shelf energy of this weld material has been satisfactorily evaluated for the period of extended operation based upon the updated material property information, as shown in Table 4.2.2-1.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) – The USE analyses have been projected to the end of the period of extended operation.

Table 4.2.2-1
LSCS Unit 1 - 54 EFPY (60-Year) Upper-Shelf Energy (USE)

Component No.	Heat	Lot	% Cu	Initial Transverse USE (ft-lb)	54 EFPY 1/4T Fluence (n/cm^2)	% Decrease USE	54 EFPY Transverse USE (ft-lb)
Unit 1 Lower Shell Assembly 307-04 Plates:							
G-5603-1	C5978-1	N/A	0.11	88.4	2.64E+17	8.5	81
G-5603-2	C5978-2	N/A	0.11	78	2.64E+17	8.5	71
G-5603-3	C5979-1	N/A	0.12	88.4	2.64E+17	9.0	80
Unit 1 Lower-Intermediate Shell Assembly 308-06 Plates:							
G-5604-1	C6345-1	N/A	0.15	107.3	7.41E+17	13.0	93
G-5604-2	C6318-1	N/A	0.12	91	7.41E+17	11.0	81
G-5604-3	C6345-2	N/A	0.15	104.7	7.41E+17	13.0	91
Unit 1 Middle Shell Assembly 308-05 Plates:							
G-5605-1	A5333-1	N/A	0.12	100.8	6.28E+17	13.0	88
G-5605-2	B0078-1	N/A	0.15	98.2	6.28E+17	15.0	83
G-5605-3	C6123-2	N/A	0.13	98.2	6.28E+17	14.5	84
Unit 1 Lower Shell Axial Welds:							
2-307A,B,&C	21935	3889	0.183	97	2.30E+17	12.5	85

Table 4.2.2-1 LSCS Unit 1 - 54 EFPY (60-Year) Upper-Shelf Energy (USE)							
Component No.	**Heat**	**Lot**	**% Cu**	**Initial Transverse USE (ft-lb)**	**54 EFPY 1/4T Fluence (n/cm^2)**	**% Decrease USE**	**54 EFPY Transverse USE (ft-lb)**
Unit 1 Lower Shell Axial Welds (continued):							
2-307A,B,&C	12008	3889	0.235	97	2.30E+17	15.0	82
2-307A,B,&C	21935 & 12008	3889 (tandem)	0.213	97	2.30E+17	14.5	83
Unit 1 Lower-Intermediate Shell Axial Welds:							
4-308A, B, & C	305414	3947	0.337	92	7.03E+17	29.0	65
4-308A, B, & C	12008	3947	0.235	92	7.03E+17	20.0	74
4-308A, B, & C	12008 & 305414	3947 (tandem)	0.286	92	7.03E+17	23.0	71
Unit 1 Middle Shell Axial Welds:							
3-308A,B,&C	305424	3889	0.273	92	6.04E+17	21.5	72
3-308A,B,&C	1P3571	3958	0.283	79	6.04E+17	22.0	62
Unit 1 Circumferential Weld Between Lower Shell and Lower-Intermediate Shell:							
1-313	4P6519	N/A	0.131	116	2.64E+17	11.0	103

Table 4.2.2-1
LSCS Unit 1 - 54 EFPY (60-Year) Upper-Shelf Energy (USE)

Component No.	Heat	Lot	% Cu	Initial Transverse USE (ft-lb)	54 EFPY 1/4T Fluence (n/cm^2)	% Decrease USE	54 EFPY Transverse USE (ft-lb)
Unit 1 Circumferential Weld Between Lower-Intermediate Shell and Middle Shell:							
6-308	6329637	N/A	0.205	103	6.28E+17	18.0	84
Unit 1 N6 LPCI Nozzle Forgings:							
N6A,B,&C	Q2Q22W	N/A	0.100	73	1.37E+17	7.5	68
Unit 1 N6 LPCI Nozzle Welds:							
N6A,B,&C	ABEA	N/A	0.040	72.8	3.12E+17	8.4	67
N6A,B,&C	FAGA	N/A	0.030	72.8	3.12E+17	8.4	67
N6A,B,&C	CCJA	N/A	0.020	72.8	3.12E+17	8.4	67
N6A,B,&C	FOAA	N/A	0.030	72.8	3.12E+17	8.4	67
N6A,B,&C	EAIB	N/A	0.120	72.8	3.12E+17	11.5	64
Unit 1 N12 Water Level Instrument Nozzle Locations in Middle Shell Assembly 308-05 Plates:							
G-5605-1	A5333-1	N/A	0.120	100.8	2.35E+17	8.6	92
G-5605-2	B0078-1	N/A	0.150	98.2	2.35E+17	9.9	88
G-5605-3	C6123-2	N/A	0.130	98.2	2.35E+17	9.1	89

Table 4.2.2-1 LSCS Unit 1 - 54 EFPY (60-Year) Upper-Shelf Energy (USE)							
Component No.	**Heat**	**Lot**	**% Cu**	**Initial Transverse USE (ft-lb)**	**54 EFPY 1/4T Fluence (n/cm^2)**	**% Decrease USE**	**54 EFPY Transverse USE (ft-lb)**
Unit 1 N12 Water Level Instrument Nozzle Welds:							
Nickel Alloy	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Unit 1 Best-Estimate Chemistry Values from BWRVIP-135 Revision 2:							
Plate	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weld	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Unit 1 Integrated Surveillance Program Chemistry Values from BWRVIP-135 Revision 2:							
Plate	C6345-1	N/A	0.140	152.5	7.41E+17	12.5	133
Weld	1P3571	N/A	0.210	114.5	6.04E+17	18.5	93

Table 4.2.2-2
LSCS Unit 2 - 54 EFPY (60-Year) Upper-Shelf Energy (USE)

Component No.	Heat	Lot	% Cu	Initial Transverse USE (ft-lb)	54 EFPY 1/4T Fluence (n/cm^2)	% Decrease USE	54 EFPY Transverse USE (ft-lb)
Unit 2 Lower Shell Assembly Plates:							
21-1	C9425-2	N/A	0.120	66.3	7.41E+17	11	59
21-2	C9425-1	N/A	0.120	61.1	7.41E+17	11	54
21-2	C9434-2	N/A	0.090	59.2	7.41E+17	10.5	53
Unit 2 Lower-Intermediate Shell Assembly Plates:							
22-1	C9481-1	N/A	0.110	95.5	8.52E+17	11	85
22-2	C9404-2	N/A	0.070	75.4	8.52E+17	10.5	67
22-3	C9601-2	N/A	0.120	69.6	8.52E+17	11	62
Unit 2 Lower Shell Assembly Axial Welds:							
BA, BB, & BC	3P4000	3933	0.020	99.0	6.50E+17	10	89
Unit 2 Lower-Intermediate Shell Assembly Axial Welds:							
BD, BE, & BF	3P4966	1214	0.026	84.0	8.02E+17	10.5	75
Unit 2 Circumferential Weld Between Lower Shell and Lower-Intermediate Shell:							
AB	5P6771	0342	0.040	61	7.41E+17	10.5	55

Table 4.2.2-2 LSCS Unit 2 - 54 EFPY (60-Year) Upper-Shelf Energy (USE)							
Component No.	**Heat**	**Lot**	**% Cu**	**Initial Transverse USE (ft-lb)**	**54 EFPY 1/4T Fluence (n/cm^2)**	**% Decrease USE**	**54 EFPY Transverse USE (ft-lb)**
Unit 2 N12 Water Level Instrument Nozzle Locations in Lower-Intermediate Shell Assembly Plates:							
22-1	C9481-1	N/A	0.110	95.5	2.72E+17	8.6	87
22-2	C9404-2	N/A	0.070	75.4	2.72E+17	8.4	69
22-3	C9601-2	N/A	0.120	69.6	2.72E+17	9	63
Unit 2 N12 Water Level Instrument Nozzle Welds:							
N12-1,2,&3	Nickel Alloy	N/A	N/A	N/A	N/A	N/A	N/A
Unit 2 N6 LPCI Nozzle Forgings:							
N6A,B,&C	Q2Q36W	N/A	0.220	66	1.53E+17	14	57
Unit 2 N6 LPCI Nozzle Welds:							
N6A,B, &C	C3L46C	J0202A27A	0.020	72.8	3.61E+17	8.9	66
N6A,B, &C (single wire)	3P4966	1214/3482)	0.020	72.8	3.61E+17	8.9	66
N6A,B, &C (tandem wire)	3P4966	1214/3482	0.020	72.8	3.61E+17	8.9	66
N6A,B, &C	05P018	D211A27A	0.090	72.8	3.61E+17	10.5	65
N6A,B, &C	04P046	D217A27A	0.060	72.8	3.61E+17	9.3	66

Table 4.2.2-2
LSCS Unit 2 - 54 EFPY (60-Year) Upper-Shelf Energy (USE)

Component No.	Heat	Lot	% Cu	Initial Transverse USE (ft-lb)	54 EFPY 1/4T Fluence (n/cm^2)	% Decrease USE	54 EFPY Transverse USE (ft-lb)
Unit 2 Best-Estimate Chemistry Values from BWRVIP-135 Revision 2:							
Plate	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weld	3P4000	N/A	0.020	99	6.50E+17	10	89
Weld	3P4966	N/A	0.025	84	8.02E+17	10.5	75
Weld	SP6771	N/A	0.034	61	7.41E+17	10.25	55
Unit 2 Integrated Surveillance Program Chemistry Values from BWRVIP-135 Revision 2:							
Plate	C3054-2	N/A	0.080	59.2	7.41E+17	10.8	53
Weld	402K9171	411L3071	0.020	61	6.50E+17	10.5	55

4.2.3 ADJUSTED REFERENCE TEMPERATURE ANALYSES

TLAA Description:

The adjusted reference temperature (ART) of the limiting beltline material is used to adjust the P-T limit curves to account for irradiation effects. Regulatory Guide 1.99, Revision 2 (Reference 4.8.4), provides the methodology for determining the ART of the limiting materials. The initial nil-ductility reference temperature, RT_{NDT}, is the temperature at which an unirradiated ferritic steel material changes in fracture characteristics from ductile to brittle behavior. RT_{NDT} is evaluated according to the procedures in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Paragraph NB-2331. Neutron embrittlement increases the RT_{NDT} beyond its initial value.

10 CFR 50, Appendix G, defines the fracture toughness requirements for the life of the vessel. The shift in the initial RT_{NDT} (ΔRT_{NDT}) is evaluated as the difference in the 30 ft-lb index temperatures from the average Charpy curves measured before and after irradiation. This increase (ΔRT_{NDT}) determines how much higher the vessel temperature must be raised for the material to continue to act in a ductile manner. The ART is defined as: Initial RT_{NDT} + ΔRT_{NDT} + Margin. Since the ΔRT_{NDT} value is a function of 32 EFPY fluence in the current ART calculations associated with the 40-year licensed operating period, these ART calculations meet the criteria of 10 CFR 54.3(a) and have been identified as TLAAs requiring evaluation for 60 years.

TLAA Evaluation:

10 CFR 50, Appendix G, requires the determination of ART values for reactor vessel beltline ferritic materials for the life of the plant. The beltline plates, axial welds, and circumferential welds are fabricated from ferritic materials. The beltline also includes the N6 Low Pressure Coolant Injection (LPCI) nozzles and welds, which are ferritic materials, and the N12 Water Level Instrument (WLI) nozzles and welds, which are nickel alloy materials, thus not ferritic. The N12 nozzle penetrations have partial penetration welds, so the 1/4T location along the limiting pressure stress cross-section is located within the surrounding ferritic plate material (see Figure 4.2.2-1), so it is appropriate to determine the ART value for these nozzles using the plate material properties. Therefore, the ART values for the N12 nozzles and welds were determined using the fluence and the limiting material property values (chemistry and initial RT_{NDT}) for the surrounding ferritic plate material. The ART values computed for the N6 nozzle forgings were computed at the 1/4T location along the limiting pressure stress cross section, as shown in Figure 4.2.2-2, where the 1/4T location remains within the nozzle forging material. The ART values computed for the N6 and N12 nozzles will be used in the development of Pressure-Temperature curves that address the applied and residual stresses in the nozzles in conjunction with the appropriate material property values resulting from 54 EFPY of neutron exposure.

As described in Section 4.2.1, 54 EFPY 1/4T fluence values were determined for LSCS Unit 1 and 2 beltline materials using the dpa attenuation method specified in Regulatory Guide 1.99, Revision 2 (Reference 4.8.4). The 1/4T fluence value for each location was used to update the ART values for 54 EFPY based upon methods consistent with Regulatory Guide 1.99, Revision 2.

Table 4.2.3-1 provides the 54 EFPY ART values computed for the beltline plates and associated axial welds and circumferential welds shown in Figure 4.2.1-1 for the Unit 1 reactor vessel, which was fabricated by Combustion Engineering (CE).

Table 4.2.3-2 provides the 54 EFPY ART results for Unit 1 N6 LPCI nozzles and welds and for the N12 WLI nozzles and welds. Table 4.2.3-2 also provides 54 EFPY ART values for Integrated Surveillance Program (ISP) plate and weld material from BWRVIP-135, Revision 2. As part of the ISP, a LaSalle plant-specific capsule was removed and tested in 2011, as described in BWRVIP Letter 2011-206, *Project No. 704 – BWRVIP-250NP: BWR Vessel and Internals Project, Testing and Evaluation of the LaSalle Unit 1 120º Surveillance Capsule,* dated November 18, 2011 (Reference 4.8.5). This provided new irradiated material property information for the Unit 1 limiting weld heat 1P3571. The adjusted reference temperature for this weld material has been satisfactorily evaluated for the period of extended operation based on the updated material property information.

Table 4.2.3-3 provides the 54 EFPY ART results for Unit 2 beltline plates and associated axial welds and the single circumferential weld shown in Figure 4.2.1-2 for the Unit 2 vessel, which was fabricated by the Chicago Bridge and Iron Co.

Table 4.2.3-4 provides the 54 EFPY ART results for Unit 2 N6 LPCI nozzles and welds and for the N12 WLI nozzles and welds. The N6 LPCI nozzles and welds are ferritic materials. The N12 nozzle forging and welds are nickel alloy materials, which are not ferritic. However, they are evaluated for ART using the fluence at the nozzle cutout location using the limiting material properties (chemistry and initial RT_{NDT}) from the surrounding plate material.

Table 4.2.3-4 also includes 54 EFPY ART values computed for best-estimate chemistry inputs from BWRVIP-135, Revision 2 data, which supersede plant-specific values where available, as required by BWR Integrated Surveillance Program procedures. It also includes 54 EFPY ART values computed for Integrated Surveillance Program weld materials from BWRVIP-135, Revision 2.

The ART values of the limiting beltline materials at 54 EFPY for each unit remain below 200 degrees F, which is the Nil-Ductility Transition (RT_{NDT}) temperature discussed in NRC Regulatory Guide 1.99, Revision 2, Section 3, above which reactor vessel solution annealing is recommended. The limiting locations are listed below.

<u>Unit 1 ART Results:</u>

- The limiting 54 EFPY ART value computed for Unit 1 is for weld heat 1P3571, resulting in an ART value of 139 degrees F that is limiting for the LaSalle Unit 1 RPV.

- The limiting 54 EFPY ART value for the Unit 1 N12 WLI nozzle is 30 degrees F, computed based upon the material properties of the surrounding shell plate G-5605-2, heat B0078-1, since the nozzle forging material is SB-166 nickel alloy material which does not require evaluation.

- The limiting 54 EFPY ART value for the Unit 1 N6 LPCI nozzle forging is 28 degrees F, computed for forging heat Q2Q22W.

<u>Unit 2 ART Results:</u>

- The limiting 54 EFPY ART value for Unit 2 is 90 degrees F, computed for beltline plate 21-2, heat C9425-1.

- The limiting 54 EFPY ART value for the Unit 2 N12 WLI nozzle is 70 degrees F, computed based upon the material properties of the surrounding shell plate 22-2, material heat C9404-2, since the nozzle forging material is SB-166 nickel alloy material which does not require evaluation.

- The limiting 54 EFPY ART value for the Unit 2 N6 LPCI nozzle is 45 degrees F, computed for forging heat Q2Q36W.

- The 54 EFPY ART value for the Unit 2 ISP weld material is 89 degrees F, computed for plate heat C3054-2.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) – The 54 EFPY ART analyses have been projected through the end of the period of extended operation.

Table 4.2.3-1
LSCS Unit 1 - 54 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT} (ºF)	54 EFPY 1/4T Fluence (n/cm^2)	ΔRT_{NDT} (ºF)	Sigma-i	Sigma-Δ	Margin (ºF)	54 EFPY Shift (ºF)	54 EFPY 1/4T ART (ºF)
Unit 1 Lower Shell Assembly 307-04 Plates:													
G-5603-1	C5978-1	N/A	0.110	0.580	74	14	2.64E+17	15	0	8	15	30	44
G-5603-2	C5978-2	N/A	0.110	0.590	74	23	2.64E+17	15	0	8	15	30	53
G-5603-3	C5979-1	N/A	0.120	0.660	84	10	2.64E+17	17	0	9	17	34	44
Unit 1 Lower-Intermediate Shell Assembly 308-06 Plates:													
G-5604-1	C6345-1	N/A	0.150	0.490	104	-20	7.41E+17	37	0	17	34	71	51
G-5604-2	C6318-1	N/A	0.120	0.510	81	-20	7.41E+17	29	0	15	29	58	38
G-5604-3	C6345-2	N/A	0.150	0.510	105	-20	7.41E+17	38	0	17	34	72	52
Unit 1 Middle Shell Assembly 308-05 Plates:													
G-5605-1	A5333-1	N/A	0.120	0.540	82	-10	6.28E+17	27	0	14	27	54	44
G-5605-2	B0078-1	N/A	0.150	0.500	105	-10	6.28E+17	35	0	17	34	69	59
G-5605-3	C6123-2	N/A	0.130	0.680	93	-10	6.28E+17	31	0	15	31	61	51
Unit 1 Lower Shell Assembly 307-04 Axial Welds:													

Table 4.2.3-1
LSCS Unit 1 - 54 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT} (ºF)	54 EFPY 1/4T Fluence (n/cm^2)	ΔRT_{NDT} (ºF)	Sigma-i	Sigma-Δ	Margin (ºF)	54 EFPY Shift (ºF)	54 EFPY 1/4T ART (ºF)
2-307A, B, C	21935	3889	0.183	0.704	173	-50	2.30E+17	32	0	16	32	65	15
Unit 1 Lower Shell Assembly 307-04 Axial Welds (continued):													
2-307A, B, C	12008	3889	0.235	0.975	233	-50	2.30E+17	44	0	22	44	87	37
2-307A, B, C (tandem)	21935 & 12008	3889	0.213	0.867	209	-50	2.30E+17	39	0	20	39	78	28
Unit 1 Lower-Intermediate Shell Assembly 308-06 Axial Welds:													
4-308A, B, C	305414	3947	0.337	0.609	209	-50	7.03E+17	73	0	28	56	129	79
4-308A, B, C	12008	3947	0.235	0.975	233	-50	7.03E+17	82	0	28	56	138	88
4-308A, B, C (tandem)	305414 & 12008	3889	0.286	0.792	219	-50	7.03E+17	77	0	28	56	133	83
Unit 1 Middle Shell Assembly 308-05 Axial Welds:													
3-308A, B, C	305424	3889	0.273	0.629	189.5	-50	6.04E+17	61	0	28	56	117	67
3-308A, B, C	1P3571	3958	0.283	0.755	212	-30	6.04E+17	69	0	28	56	125	95
Unit 1 Lower-to-Intermediate Shell Circumferential Weld:													

Table 4.2.3-1
LSCS Unit 1 - 54 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT} (ºF)	54 EFPY 1/4T Fluence (n/cm^2)	ΔRT_{NDT} (ºF)	Sigma-i	Sigma-Δ	Margin (ºF)	54 EFPY Shift (ºF)	54 EFPY 1/4T ART (ºF)
1-313	4P6519	N/A	0.131	0.06	64	-52	2.64E+17	13	0	7	13	26	-26
Unit 1 Middle-to-Lower-Intermediate Shell Circumferential Weld:													
6-308	6329637	N/A	0.205	0.105	98	-50	6.28E+17	32	0	16	32	65	15

Table 4.2.3-2
LSCS Unit 1 - 54 EFPY Adjusted Reference Temperature (ART) Values for Beltline Nozzles and Welds and Integrated Surveillance Program Welds

Beltline I.D.	Heat No.	Lot No.	Cu	Ni	CF	Initial RT_{NDT}	54 EFPY 1/4T Fluence n/cm^2	$\Delta\ RT_{NDT}$	Sigma-i	Sigma-Δ	Margin ºF	54 EFPY Shift ºF	54 EFPY 1/4T ART ºF
Unit 1 N12 Water Level Instrumentation Nozzle (WLI) Locations in Middle Shell Assembly 308-05 Plates:													
G-5605-1	A5333-1	N/A	0.120	0.540	82	-10	2.35E+17	16	0	8	16	31	21
G-5605-2	B0078-1	N/A	0.150	0.500	105	-10	2.35E+17	20	0	10	20	40	30
G-5605-3	C6123-2	N/A	0.130	0.680	93	-10	2.35E+17	18	0	9	18	35	25
Unit 1 N12 WLI Nozzle Welds:													
N12A, B, C	SB-166	Nickel Alloy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Unit 1 N6 Low Pressure Coolant Injection (LPCI) Nozzle Forgings:													
N6A, B, C extraction path	Q2Q22W	N/A	0.100	0.820	67	10	1.37E+17	9	0	5	9	18	28
Unit 1 N6 LPCI Nozzle-to-Shell Welds:													
N6A, B, C	ABEA	N/A	0.040	0.980	54	-50	3.12E+17	12	0	6	12	24	-26
N6A,B,&C	FAGA	N/A	0.030	0.950	41	-50	3.12E+17	9	0	5	9	18	-32
Unit 1 N6 LPCI Nozzle-to-Shell Welds (continued):													

Table 4.2.3-2
LSCS Unit 1 - 54 EFPY Adjusted Reference Temperature (ART) Values for Beltline Nozzles and Welds and Integrated Surveillance Program Welds

Beltline I.D.	Heat No.	Lot No.	Cu	Ni	CF	Initial RT_{NDT}	54 EFPY 1/4T Fluence n/cm^2	Δ RT_{NDT}	Sigma-i	Sigma-Δ	Margin ºF	54 EFPY Shift ºF	54 EFPY 1/4T ART ºF
N6A,B,&C	CCJA	N/A	0.020	0.860	27	-50	3.12E+17	6	0	3	6	12	-38
N6A,B,&C	FOAA	N/A	0.030	1.000	41	-50	3.12E+17	9	0	5	9	18	-32
N6A,B,&C	EAIB	N/A	0.120	0.860	155	-50	3.12E+17	35	0	17	34	69	19
Unit 1 Best-Estimate Chemistry Values from BWRVIP-135 Revision 2:													
Plate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welds:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Unit 1 Integrated Surveillance Program Chemistry Values from BWRVIP-135 Revision 2:													
Plate	C6345-1	N/A	0.140	0.540	152.4	-20	7.41E+17	55	0	8.5	17	72	52
Weld	1P3571	N/A	0.210	0.750	437	-30	6.04E+17	141	0	14	28	169	139

Table 4.2.3-3
LSCS Unit 2 - 54 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT}	54 EFPY 1/4T Fluence	ΔRT_{NDT} ºF	Sigma-i	Sigma-Δ	Margin ºF	54 EFPY Shift ºF	54 EFPY 1/4T ART ºF
Unit 2 Lower Shell Plates:													
21-1	C9425-2	N/A	0.120	0.510	81	30	7.41E+17	29	0	15	29	58	88
21-2	C9425-1	N/A	0.120	0.510	81	32	7.41E+17	29	0	15	29	58	90
21-3	C9434-2	N/A	0.090	0.510	58	10	7.41E+17	21	0	10	21	42	52
Unit 2 Lower-Intermediate Shell Plates:													
22-1	C9481-1	N/A	0.110	0.500	73	10	8.52E+17	28	0	14	28	56	66
22-2	C9404-2	N/A	0.070	0.490	44	52	8.52E+17	17	0	8	17	34	86
22-3	C9601-2	N/A	0.120	0.500	81	10	8.52E+17	31	0	16	31	62	72
Unit 2 Lower Shell Axial Welds:													
BA, BB, BC	3P4000	3933	0.020	0.930	27	-50	6.50E+17	9	0	5	9	18	-32
Unit 2 Lower-Intermediate Shell Axial Welds:													
BD, BE, BF	3P4966	1214	0.026	0.920	41	-6	8.02E+17	15	0	8	15	31	25
Unit 2 Lower Shell-to-Lower-Intermediate Shell Circumferential Weld:													
AB	5P6771	0342	0.040	0.940	54	-34	7.41E+17	19	0	10	19	39	5

Table 4.2.3-4
LSCS Unit 2 - 54 EFPY Adjusted Reference Temperature (ART) Values for Beltline Nozzles and Welds and Integrated Surveillance Program Welds

Beltline I.D.	Heat No.	Lot No.	Cu	Ni	CF	Initial RT_{NDT}	54 EFPY 1/4T Fluence n/cm^2	Δ RT_{NDT}	Sigma-i	Sigma-Δ	Margin ºF	54 EFPY Shift ºF	54 EFPY 1/4T ART ºF
Unit 2 N12 Nozzle Location in Lower-Intermediate Shell Plates:													
22-1	C9481-1	N/A	0.110	0.500	73	10	2.72E+17	15	0	8	15	30	40
22-2	C9404-2	N/A	0.070	0.490	44	52	2.72E+17	9	0	5	9	18	70
22-3	C9601-2	N/A	0.120	0.500	81	10	2.72E+17	17	0	8	17	34	44
Unit 2 N6 Low Pressure Coolant Injection (LPCI) Nozzle Forgings:													
N6A,B,&C extract path	Q2Q36W	N/A	0.220	0.830	177	-6	1.53E+17	26	0	13	26	51	45
Unit 2 N6 LPCI Nozzle-to-Shell Welds:													
N6A,B,&C	C3L46C	J020A27A	0.020	0.870	27	-20	3.61E+17	7	0	3	7	13	-7
N6A,B,&C	3P4966	1214/3482	0.020	0.800	27	-30	3.61E+17	7	0	3	7	13	-17
N6A,B,&C	3P4966 tandem	1214/3482	0.020	0.920	27	-48	3.61E+17	7	0	3	7	13	-35
N6A,B,&C	05P018	D211A27A	0.090	0.900	122	-38	3.61E+17	30	0	15	30	60	22
N6A,B,&C	04P046	D217A27A	0.060	0.900	82	-48	3.61E+17	20	0	10	20	40	-8
Unit 2 Best-Estimate Chemistry Values from BWRVIP-135 Revision 2:													

Table 4.2.3-4
LSCS Unit 2 - 54 EFPY Adjusted Reference Temperature (ART) Values for Beltline Nozzles and Welds and Integrated Surveillance Program Welds

Beltline I.D.	Heat No.	Lot No.	Cu	Ni	CF	Initial RT_{NDT}	54 EFPY 1/4T Fluence n/cm^2	Δ RT_{NDT}	Sigma-i	Sigma-Δ	Margin ºF	54 EFPY Shift ºF	54 EFPY 1/4T ART ºF
Plate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weld:	3P4000	N/A	0.020	0.935	27	-50	6.50E+17	9	0	5	9	18	-32
Weld:	3P4966	N/A	0.025	0.913	34	-6	8.02E+17	13	1	6	13	25	19
Weld:	5P6771	N/A	0.034	0.934	46	-34	7.41E+17	17	2	8	17	33	-1
Unit 2 Integrated Surveillance Program Chemistry Values from BWRVIP-135 Revision 2:													
Plate	C3054-2	N/A	0.080	0.670	51	52	7.41E+17	18	0	9	18	37	89
Weld	402K9171	411L3071	0.020	0.950	27	-6	6.50E+17	9	0	5	9	18	12

4.2.4 PRESSURE-TEMPERATURE LIMITS

TLAA Description:

10 CFR 50 Appendix G requires that the reactor pressure vessel be maintained within established pressure-temperature (P-T) limits, including heatup and cooldown operations. These limits specify the minimum acceptable reactor coolant temperature as a function of reactor pressure. As the reactor pressure vessel is exposed to increased neutron irradiation over time, its fracture toughness is reduced. The P-T limits must account for the change in material properties due to anticipated reactor vessel fluence.

The current Pressure-Temperature limit curves are located in the Technical Specifications and are based upon 32 EFPY fluence projections that were considered to represent the amount of power to be generated over 40 years of plant operation, assuming a 40-year average capacity factor of 80 percent. Since the 32 EFPY projections are based upon a 40-year assumption, the P-T limit curves satisfy the criteria of 10 CFR 54.3(a) and have been identified as TLAAs.

TLAA Evaluation:

In accordance with NUREG-1800, Revision 2, Section 4.2.2.1.3, for plants with P-T limits that are located in the Technical Specifications (TS), new P-T limits for the period of extended operation need not be submitted as part of the LRA since they are required to be updated through the 10 CFR 50.90 licensing process. It further states that for those plants that have approved pressure-temperature limit reports (PTLRs) the P-T limits for the period of extended operation will be updated at the appropriate time through the plant's Administrative Section of the TS and the plant's PTLR process. In either case, the 10 CFR 50.90 or the PTLR process, whichever constitutes the current licensing basis, will ensure that the P-T limits for the period of extended operation will be updated prior to expiration of the 32 EFPY P-T limit curves. The analyses supporting the P-T curves will consider all locations within the reactor coolant pressure boundary.

The LSCS P-T limits are currently located in the Technical Specifications, but a PTLR may be submitted for NRC approval for the next P-T limit update, which must occur prior to 32 EFPY. Updated P-T limits will be approved for use prior to 32 EFPY for each unit. Maintenance of the P-T limits during the period of extended operation will be managed using the applicable process as described above.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) of the reactor vessels will be adequately managed through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). P-T limits will be updated prior to exceeding 32 EFPY, either through the 10 CFR 50.90 process, as currently required by Technical Specifications, or by the PTLR process and the plant's Administrative Section of TS if a PTLR report has been approved at that time.

4.2.5 AXIAL WELD FAILURE PROBABILITY ASSESSMENT ANALYSES

TLAA Description:

The BWRVIP recommendations for inspection of reactor pressure vessel shell welds in BWRVIP-05 (Reference 4.8.8) include examination of 100 percent of the axial welds and inspection of the circumferential welds only at the intersections of these welds with the axial welds. BWRVIP-05 contains generic analyses supporting a conclusion in the NRC SER (Reference 4.8.9) that the generic-plant axial weld failure probability is orders of magnitude greater than the 40-year end-of-life circumferential weld failure probability, and this analysis was used to justify relief from inspection of the circumferential welds as permitted in Generic Letter 98-05 (Reference 4.8.7) and as described in LRA Section 4.2.6. The failure frequency is dependent upon given assumptions of flaw density, distribution, and location. Since the current axial weld failure probability assessments for the Combustion Engineering (CE) Owners Group (CEOG) reactor vessels and for the Chicago Bridge and Iron (CB& I) reactor vessels are based upon 32 EFPY fluence values associated with 40 years of operation, they have been identified as TLAAs requiring evaluation for 54 EFPY through the period of extended operation.

TLAA Evaluation:

The NRC assessment provided in the Final Safety Evaluation Report (FSER) to BWRVIP-05 (Reference 4.8.9) computed an axial weld failure probability value of 8.28E-01 for the CE (CEOG) vessel at 64 EFPY and an axial weld failure probability of 3.82E-01 for the CB& I vessel at 64 EFPY. In order to evaluate axial weld failure probability assessments for 60 years for the LSCS Unit 1 CE vessel and the LSCS Unit 2 CB&I vessel, 54 EFPY fluence values were derived for the limiting axial welds for each vessel from the RAMA fluence projections described in Section 4.2.1. Using these inside surface (0T) fluence values (References 4.8.1 and 4.8.3), the Mean RT_{NDT} values were determined for these welds on each unit.

Table 4.2.5-1 provides a comparison between the NRC 64 EFPY axial weld failure probability assessment for the CE (CEOG) vessel and the 54 EFPY axial weld failure probability assessment for the LSCS Unit 1 CE vessel. Table 4.2.5-2 provides a comparison between the NRC 64 EFPY axial weld failure probability assessment for the CB&I vessel and the 54 EFPY axial weld failure probability assessment for the LSCS Unit 2 CB&I vessel. Although a conditional failure probability has not been calculated for the LSCS units at 54 EFPY, since the Unit 1 Mean RT_{NDT} value of 139.9 degrees F is less than the NRC value of 172.4 degrees F for the CE vessel and since the Unit 2 Mean RT_{NDT} value of 12 degrees F is less than the NRC value of 117.1 degrees F for the CB&I vessel, it is concluded that the Unit 1 and 2 conditional failure probabilities are bounded by the NRC analyses, consistent with the requirements defined in GL 98-05. Therefore, the projected mean RT_{NDT} values remain bounded by the NRC analyses.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) – The RPV axial weld failure probability assessments have been projected through the period of extended operation.

Table 4.2.5-1
Comparison of NRC 64 EFPY Axial Weld Failure Probability Assessment for CE (CEOG) RPV to LSCS Unit 1 54 EFPY Axial Weld Failure Probability Assessment

Parameter	NRC Staff CE RPV 64 EFPY Axial Weld Assessment [1]	LSCS Unit 1 54 EFPY Axial Weld Assessment
	(CE CEOG RPV)	(CE RPV Middle Shell Axial Welds 3-308A, B, & C)
Copper Content (%)	0.219	0.210
Nickel Content (%)	.996	0.750
Chemistry Factor (CF)	231.1	437
Fluence at 0T (n/cm^2)	4.0E+18	8.66E+17
Unirradiated Reference Temperature $RT_{NDT(U)}$ (ºF)	0	-30
Shift in Reference Temperature ΔRT_{NDT} (ºF)(without margin) [2]	172.4	169.9
Mean RT_{NDT} (ºF)	172.4	139.9
Probability of Failure Event	8.28E-01	[3]

NOTES:

[1] The NRC data is obtained from BWRVIP-05 Report, "Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report, July 28, 1998 (Reference 4.8.9).

[2] $\Delta RT_{NDT} = CF * f^{(0.28 - 0.10 \log f)}$, where f is fluence in units of E+19 n/cm^2.

[3] Although a conditional failure probability has not been calculated for LSCS, since the LSCS Mean RT_{NDT} values are less than the NRC values, it is concluded that the LSCS conditional failure probability is bounded by the NRC analysis, consistent with the requirements defined in GL 98-05.

Table 4.2.5-2
Comparison of NRC 64 EFPY Axial Weld Failure Probability Assessment for CB&I RPV to LSCS Unit 2 54 EFPY Axial Weld Failure Probability Assessment

Parameter	NRC Staff 64 EFPY Axial Weld Assessment [1]	Unit 2 54 EFPY Axial Weld Assessment
	(CB&I RPV)	(CB&I RPV Lower-Intermediate Shell Axial Welds BD, BE, & BF)
Copper Content (%)	0.10	0.026
Nickel Content (%)	1.08	0.920
Chemistry Factor (CF)	135	41
Fluence at 0T (n/cm^2)	1.38E+19	1.14E+18
Unirradiated Reference Temperature $RT_{NDT(U)}$ (ºF)	-30	-6
Shift in Reference Temperature ΔRT_{NDT} (ºF)(without margin) **[2]**	147.1	18
Mean RT_{NDT} (ºF)	117.1	12
Probability of Failure Event	3.82E-01	**[3]**

NOTES:

[1] The NRC data is obtained from BWRVIP-05 Report, "Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report, July 28, 1998 (Reference 4.8.9).

[2] ΔRT_{NDT} = CF * f $^{(0.28 - 0.10 \log f)}$, where f is fluence in units of E+19 n/cm^2.

[3] Although a conditional failure probability has not been calculated for LSCS, since the LSCS Mean RT_{NDT} values are significantly less than the NRC values, it is concluded that the LSCS conditional failure probability is bounded by the NRC analysis, consistent with the requirements defined in GL 98-05.

4.2.6 CIRCUMFERENTIAL WELD FAILURE PROBABILITY ASSESSMENT ANALYSES

TLAA Description:

LSCS has previously applied for and been granted relief from RPV circumferential weld inspection for the Unit 1 CE vessel and for the Unit 2 CB&I vessel, as described in the January 28, 2004 SER for Relief Request CR-38 (Reference 4.4.38).

The evaluation compared the 32 EFPY properties of the LSCS Unit 1 limiting circumferential weld 6-308 with the 32 EFPY properties of the CE (CEOG) reactor vessel evaluated by the NRC in the safety evaluation report for BRWVIP-05 for conditional failure probability of circumferential welds. The evaluation resulted in a Unit 1 Mean RT_{NDT} value of -8.8 degrees F, which is less than the NRC value of 98.1 degrees F. It was therefore concluded that the LaSalle Unit 1 circumferential welds at 32 EFPY are bounded by the conditional failure probability of 6.34 E-05 calculated by the NRC for CE (CEOG) vessels.

The evaluation for LSCS Unit 2 CB&I reactor vessel limiting circumferential weld AB resulted in a Unit 2 Mean RT_{NDT} value of -10.5 degrees F, which is less than the NRC value of 44.5 degrees F. It was therefore concluded that the LaSalle Unit 2 circumferential welds at 32 EFPY are bounded by the conditional failure probability of 2.00E-07 calculated by the NRC for CB&I vessels.

Since the current circumferential weld failure probability assessments are based upon 32 EFPY fluence values associated with 40 years of operation, they have been identified as TLAAs requiring evaluation for the period of extended operation.

TLAA Evaluation:

The NRC assessment provided in the "Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report," (Reference 4.8.9) computed a circumferential weld failure probability value for the CE (CEOG) vessel at 64 EFPY that resulted in a Probability of Failure Event of 4.38 E-04. It also computed a circumferential weld failure probability for the CB&I vessel at 64 EFPY which resulted in a Probability of Failure Event of 1.78E-05. Each of these probabilities was deemed acceptable in comparison to the axial weld probability of failure for the same vessel, which were orders of magnitude higher.

In order to evaluate the LSCS Unit 1 and 2 circumferential weld failure probability assessments for 60 years, 54 EFPY fluence values were derived for the limiting circumferential weld from the RAMA fluence projections described in Section 4.2.1. Using the inside surface (0T) fluence values (Reference 4.8.1 and 4.8.3) for these welds, the LSCS Mean RT_{NDT} values were determined for each unit.

Table’s 4.2.6-1 and 4.2.6-2 compare the 64 EFPY values used by the NRC to assess circumferential weld probability to the 54 EFPY values for LSCS Unit 1 and Unit 2 respectively. Although a conditional failure probability has not been calculated for the LSCS units, since the Unit 1 Mean RT_{NDT} value of -11 degrees F at 54 EFPY is less than the NRC value of 128.5 degrees F for the CE vessel and since the Unit 2 Mean RT_{NDT} value of -11 degrees F at 54 EFPY is less than the NRC value of 70.6 degrees F for the

CB&I vessel, it is concluded that the Unit 1 and 2 conditional failure probabilities are bounded by the NRC analyses, consistent with the requirements defined in GL 98-05.

Reapplication for relief from circumferential weld examination will be made under 10 CFR 50.55a(a)(3) in time for NRC review and approval prior to the period of extended operation. The plant-specific information described above demonstrates that at the end of the period of extended operation, the circumferential beltline weld materials meet the limiting conditional failure probability for circumferential welds specified in the FSER of BWRVIP-05.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The RPV circumferential weld failure probability assessments have been updated through the period of extended operation. Circumferential weld inspection relief, if necessary for the period of extended operation, will be requested through a reapplication under the 10 CFR 50.55a process.

Table 4.2.6-1
Comparison of NRC 64 EFPY Circumferential Weld Failure Probability Assessment for CE (CEOG) RPV to LSCS Unit 1 54 EFPY Circumferential Weld Failure Probability Assessment

Parameter	NRC Staff CE RPV 64 EFPY Circumferential Weld Assessment [1]	LSCS Unit 1 54 EFPY Circumferential Weld Assessment
	(CE CEOG RPV)	(CE RPV Weld 6-308)
Copper Content (%)	0.183	0.205
Nickel Content (%)	0.704	0.105
Chemistry Factor (CF)	172.2	98
Fluence at 0T (n/cm^2)	4.0E+18	9.01E+17
Unirradiated Reference Temperature $RT_{NDT(U)}$ (ºF)	0	-50
Shift in Reference Temperature ΔRT_{NDT} (ºF)(without margin) [2]	128.5	39
Mean RT_{NDT} (ºF)	128.5	-11
Probability of Failure Event	4.38E-04	[3]

NOTES:

[1] The NRC data is obtained from BWRVIP-05 Report, "Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report, July 28, 1998 (Reference 4.8.9).

[2] ΔRT_{NDT} = CF * f $^{(0.28 – 0.10 \log f)}$, where f is fluence in units of E+19 n/cm^2.

[3] Although a conditional failure probability has not been calculated for LSCS, since the LSCS Mean RT_{NDT} values are significantly less than the NRC values, it is concluded that the LSCS conditional failure probability is bounded by the NRC analysis, consistent with the requirements defined in GL 98-05.

Table 4.2.6-2
Comparison of NRC 64 EFPY Circumferential Weld Failure Probability Assessment for CB&I RPV to LSCS Unit 2 54 EFPY

Circumferential Weld Failure Probability Assessment

Parameter	NRC Staff 64 EFPY Circumferential Weld Assessment [1]	Unit 2 54 EFPY Circumferential Weld Assessment
	(CB&I RPV)	(CB&I RPV Weld AB)
Copper Content (%)	0.10	0.040
Nickel Content (%)	0.99	0.940
Chemistry Factor (CF)	134.9	54
Fluence at 0T (n/cm^2)	1.02E+19	1.06E+18
Unirradiated Reference Temperature $RT_{NDT(U)}$ (ºF)	-65	-34
Shift in Reference Temperature ΔRT_{NDT} (ºF)(without margin) [2]	135.6	23
Mean RT_{NDT} (ºF)	70.6	-11
Probability of Failure Event	1.78E-05	[3]

NOTES:

[1] The NRC data is obtained from BWRVIP-05 Report, "Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report, July 28, 1998 (Reference 4.8.9).

[2] ΔRT_{NDT} = CF * f $^{(0.28 - 0.10 \log f)}$, where f is fluence in units of E+19 n/cm^2.

[3] Although a conditional failure probability has not been calculated for LSCS, since the LSCS Mean RT_{NDT} values are significantly less than the NRC values, it is concluded that the LSCS conditional failure probability is bounded by the NRC analysis, consistent with the requirements defined in GL 98-05.

4.2.7 REACTOR PRESSURE VESSEL REFLOOD THERMAL SHOCK ANALYSIS

TLAA Description:

10CFR50 Appendix A, General Design Criterion 31 (Reference 4.8.35), shown below, requires that the reactor coolant pressure boundary of a light water reactor be designed such that it possesses adequate margin against non-ductile failure for all postulated conditions:

Criterion 31—*Fracture prevention of reactor coolant pressure boundary. The reactor coolant pressure boundary shall be designed with sufficient margin to assure that when stressed under operating, maintenance, testing, and postulated accident conditions (1) the boundary behaves in a non-brittle manner and (2) the probability of rapidly propagating fracture is minimized. The design shall reflect consideration of service temperatures and other conditions of the boundary material under operating, maintenance, testing, and postulated accident conditions and the uncertainties in determining (1) material properties, (2) the effects of irradiation on material properties, (3) residual, steady state and transient stresses, and (4) size of flaws.*

For Boiling Water Reactors (BWRs) designed by General Electric (GE), this requirement was demonstrated both by development of Pressure-Temperature Limit Curves, which are addressed in LRA Section 4.2.4, and by reference to generic fracture mechanics analyses (References 4.8.10 and 4.8.11) that evaluate the effects of the limiting Loss of Coolant Accident (LOCA) event. The postulated Sudden Rupture of a Main Steam Line LOCA was determined to be bounding of all other LOCA events with respect to these evaluations. Several emergency core cooling systems are activated at different times after the LOCA and the reactor vessel is flooded with cooling water. The reactor vessel blowdown and the subsequent injection of cold water produce low temperature and high thermal stresses in the reactor vessel. These analyses are often called RPV reflood thermal shock analyses.

The acceptance criterion used in these fracture mechanics analyses is that the crack driving force for postulated flaws in the RPV, K_I, present during the bounding Emergency or Faulted condition (Service Level C and D), is less than the limiting material resistance to fracture, K_{IC}, applicable during the event. The temperature distribution and the resulting thermal stress in the vessel wall were determined using a finite element solution. The applied stress intensity factor was calculated as a function of crack depth for a postulated surface crack in the beltline region of the reactor vessel wall for the combined thermal, pressure, and residual stresses. The available toughness, calculated as a function of crack tip temperature and fluence level, was determined to be significantly higher than the applied stress intensity factor at all times during the transient. It was concluded that the reactor vessel has a considerable margin to failure by brittle fracture even in the presence of large postulated initial flaws.

Since these generic analyses are bounding for LSCS, they are considered to be within the CLB, and since they are based upon BWR vessel material properties and cumulative fluence assumed for 40 years of operation, they have been identified as TLAAs requiring evaluation for the period of extended operation.

TLAA Evaluation:

For license renewal, an updated reflood thermal shock analysis was prepared that is bounding for both the Unit 1 and Unit 2 RPV that demonstrates there will continue to be adequate margin against non-ductile failure for the Emergency and Faulted conditions (Service Level C/D) through the period of extended operation (PEO), as required by 10 CFR 50 GDC 31.

References 4.8.10 and 4.8.11 only addressed this requirement for the RPV shell plates and welds since, at the time these analyses were prepared, nozzles were not expected to receive sufficient irradiation during the life of the plant to require inclusion within the beltline. However, due to increased capacity factors and power uprates, the N6 LPCI nozzles and N12 Water Level Instrument nozzles have been added to the beltline since they are now predicted to have fluence exceeding 1.0E+17 n/cm^2 prior to reaching 40 years of service. Therefore, a 60-year, 54 EFPY fracture mechanics analysis of the limiting N6 LPCI nozzles was prepared to augment the 54 EFPY updated RPV shell fracture mechanics analysis in order to demonstrate adequate margin against non-ductile failure for all beltline materials through the PEO.

The beltline shells (plates and welds) and the beltline nozzles were considered separately, as described below:

Beltline Shell Materials

The beltline shell materials were evaluated by updating the analyses documented in References 4.8.10 and 4.8.11 to evaluate the component with the limiting material properties from the LSCS Unit 1 and Unit 2 RPV beltline plates, axial welds, and circumferential welds, which bound the remainder.

The crack driving forces at the limiting times that were documented in References 4.8.10 and 4.8.11 were identified for evaluation in the updated analysis. Postulated flaws of depth up to and including the flaw sizes that can be accepted in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, IWB-3500 (Reference 4.8.36) were evaluated. It is considered necessary to demonstrate that adequate margin against non-ductile failure exists for the LSCS Unit 1 and Unit 2 beltline materials for postulated flaw sizes less than or equal to those acceptable, without disposition, by ASME Section XI, IWB-3500 considering operation through the PEO. The methodology is described below, followed by the results obtained in evaluating the Main Steam line break and in evaluating the Recirculation line break.

The ASME Section XI flaw evaluation rules given in IWB-3600 are used to select structural factors appropriate for evaluation of Service Level D conditions; so a required structural factor of 1.414 is used in this evaluation. The crack driving force, $K_{I\text{-applied}}$, was compared to the allowable Mode I, plane-strain, static-initiation fracture toughness, (K_{Ic} / 1.414), to demonstrate flaw stability. K_{Ia} and K_{Ic} are calculated using the equations given in ASME Section XI, Non-mandatory Appendix A (Reference 4.8.37) and using the through-wall temperature distribution applicable to the limiting time steps.

If $K_{I\text{-applied}}$ > K_{Ic} / 1.414, then it must be shown that $K_{I\text{-applied}}$ drops below the Mode I, plane-strain, crack-arrest allowable fracture toughness (K_{Ia} / 1.414) prior to the flaw reaching a depth greater than 75 percent of the wall thickness, $K_{I\text{-applied}}$ < (K_{Ia} / 1.414 (at a depth < 0.75T).

Main Steam Line Break Analysis

Reference 4.8.10 evaluated the RPV shell materials during a Main Steam line break LOCA. This analysis has been updated using the bounding 54 EFPY inside surface (0T) fluence values for the Unit 1 RPV and Unit 2 RPV beltline materials. The results of this analysis are shown below in Table 4.2.7-1.

Table 4.2.7-1
Crack Stability Analysis for Beltline Shells During Main Steam Line Break

Minimum Vessel Temperature	280
Limiting 54 EFPY 0T ART Value - Weld Heat 1P3571 (degrees F)	168
T-ART (degrees F)	112
K_{IC}/1.414 (ksi√in)	141
Maximum $K_{I\text{-applied}}$ (ksi√in)	105
Margin	1.3

The original analysis determined that the minimum temperature at the vessel inside surface at any time during the transient is 280 degrees F. The current analysis determined that the limiting ART value is 168 degrees F for weld 1P3571, using the 0T fluence value of 8.66E+17 n/cm^2 with the material property values obtained from the Integrated Surveillance Program (ISP) for this material. This heat of material is present in Unit 1 beltline welds 3-308A, B, and C. The original analysis showed that the maximum $K_{I\text{-applied}}$ value in the vessel at any time during the transient was 105 ksi√in (Reference 4.8.11, Figure 5). The current analysis shows that the K_{Ic}/1.414 value at 54 EFPY is 141 ksi√in. Therefore, since the applied stress intensity is 30 percent less than the material crack initiation value, it has been demonstrated that a postulated flaw in the either the Unit 1 or Unit 2 vessel would be stable with respect to non-ductile fracture following a Main Steam line break.

Recirculation Line Break Analysis

In Reference 4.8.10, the Recirculation line break LOCA was evaluated. A summary of this analysis at selected times during the transient is presented in Table 4.2.7-2, but with updated material properties at 54 EFPY. Note that K_{Ic} is determined using crack tip temperature at the maximum allowable crack depth of 0.052T and ART is based on the limiting inside surface (0T) fluence.

Table 4.2.7-2
Crack Stability Analysis for Beltline Shells During Recirculation Line Break

Time During Transient (s)	0	25	84	480	1200	3000
Temperature at 0.052T	550	450	450	160	120	80
Limiting 0T 54 EFPY ART (ºF)	168	168	168	168	168	168
T-ART (ºF)	382	282	282	-8	-48	-88
$K_{Ic}/1.414$ (ksi√in)	141	141	141	**36**	**29**	26
$K_{I\text{-applied}}$ at 0.52T(ksi√in)	33	47	20	**56**	**47**	24
Margin	4.3	3.0	7.1	**0.6**	**0.6**	1.1

Table 4.7-2 shows that at times 0, 25, 84, and 3,000 seconds after the start of the transient, the applied stress intensity factor, $K_{I\text{-applied}}$ at 0.52T, is less than the available toughness, $K_{Ic}/1.414$, calculated as a function of crack tip temperature and the bounding 0T fluence level. However, at 480 seconds and 1,200 seconds after the start of the transient, the applied stress intensity factor exceeds the available toughness value by 40 percent, which would indicate the initiation and propagation of a crack during that time period. However, since fluence actually attenuates as a function of distance from the inside surface, further analysis may be performed to take into account the reduced fluence as a function of crack depth. If crack initiation still occurs, the cracking must be shown to arrest prior to reaching 0.75T in order to meet the acceptance criteria.

In order to obtain a more detailed through-wall temperature distribution in the RPV shell, a transient thermal analysis was performed. At times 480 seconds and 1,200 seconds after the start of the transient, the $K_{Ic,}$ crack initiation stress intensity factor and the K_{Ia}, the crack arrest stress intensity factor were determined as a function of crack depth, considering both the crack tip temperature and the local ART, which is adjusted from the 0T ART value previously described by accounting for fluence attenuation through the vessel wall thickness. Figures 4.2.7-1 and 4.2.7-2 provide plots at times 480 and 1,200 seconds, respectively, of the applied stress intensity factor, $K_{I\text{-applied},}$ compared to the adjusted crack initiation stress intensity factor, $K_{Ic}/1.414_{,}$ and to the adjusted crack arrest stress intensity factor, $K_{Ia}/1.414$, and as a function of crack depth (a/T) for the Recirculation Line break transient. The 1.414 value is the structural adjustment factor used to define the allowable fracture toughness. The plots show that at times 480 and 1,200 seconds after the start of the transient, shallow cracks may initiate ($K_{I\text{-applied}} > K_{Ic}$) and propagate ($K_{I\text{-applied}} > K_{Ia}$), but that crack growth will arrest ($K_{I\text{-applied}} < K_{Ia}$) well before cracks reach a depth of 0.75T. Therefore, the acceptance criteria of ASME Section XI have been satisfied for the limiting Unit 1 and Unit 2 RPV shell material. It is concluded that the reactor vessel shell materials, bounded by the 1P3571 weld material, will continue to have a considerable margin to failure by brittle fracture during the period of extended operation.

Figure 4.2.7-1 K vs. a/T for Recirculation Line Break at t = 480 seconds

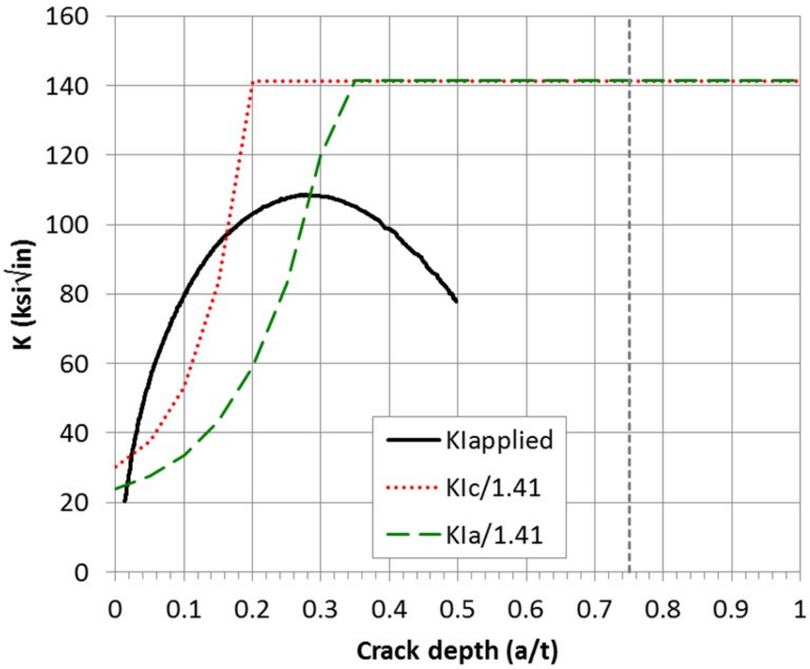
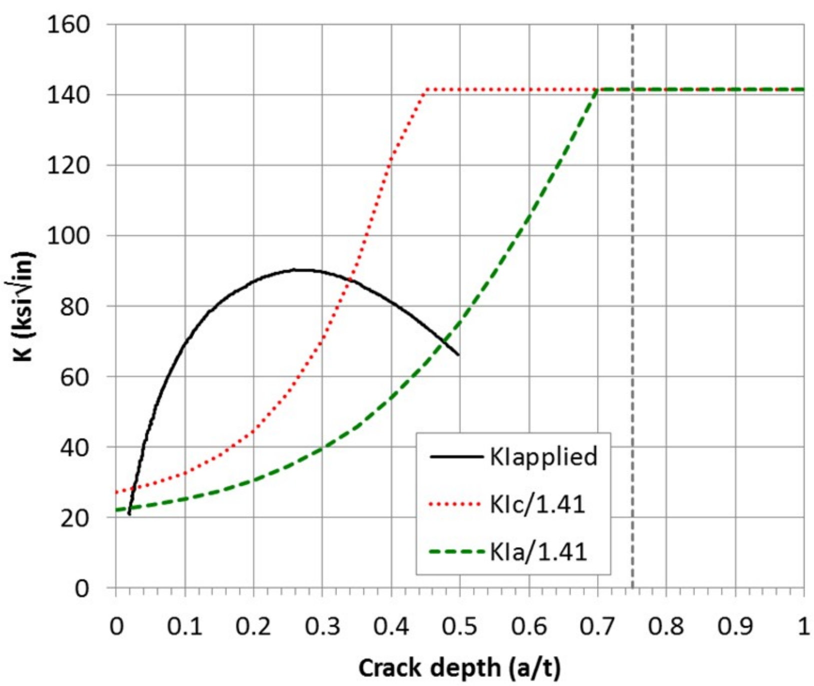


Figure 4.2.7-2 K versus a/T for Recirculation Line Break at t = 1,200 seconds



Beltline Nozzles

The N6 Low Pressure Coolant Injection (LPCI) nozzles are selected as the limiting beltline nozzles since the Emergency Core Coolant System (ECCS) injects coolant through this nozzle following a LOCA. Consequently, there is a severe thermal transient at this location following the design basis LOCA.

The finite element analysis (FEA) results are documented in the LSCS Unit 1 and Unit 2 RPV stress analyses. The bounding temperature distribution in the LPCI Nozzle analyzed for both units is selected. A thermal stress distribution is developed from this temperature profile, which is then used to calculate a stress intensity factor.

Since there is negligible pressure in the RPV following the LOCA event and since the location of the highest thermal stresses is remote from welds, there is no K_I from internal pressure or weld residual stress. A flat plate K_I solution for a point load acting at an arbitrary location along the crack front is selected. The point load is replaced with $\sigma(x)dx$ then integrated over the crack depth in order to obtain the K_I caused by the thermal stress distribution. The same acceptance criteria as described for the beltline shells are applied for the nozzle.

The resulting $K_{I\text{-applied}}$ value is significantly less than the allowable fracture toughness value, $K_{Ic}/1.414$, therefore demonstrating adequate margin against non-ductile fracture for the Unit 1 and Unit 2 nozzles.

Conclusion

All beltline materials in the LSCS Unit 1 and Unit 2 RPVs have been shown to satisfy the acceptance criteria documented above for postulated flaw sizes less than or equal to the flaws acceptable without evaluation in ASME Section XI, IWB-3500 for operation through the period of extended operation.

TLAA Disposition: 10CFR54.21(c)(1)(ii): The reflood thermal shock analyses have been projected through the period of extended operation.

4.2.8 RPV CORE PLATE RIM HOLD-DOWN BOLT LOSS OF PRELOAD ANALYSIS

TLAA Description:

The RPV core plate is attached to the core support structure by 34 stainless steel hold-down bolts arranged along the rim of the plate. These core plate rim bolts are 2.5 inches in diameter and approximately 28.4 inches long. The bolts were preloaded during initial installation but are subject to stress relaxation (loss of preload) as a result of irradiation effects. The stress state of these bolts was evaluated as part of the analysis performed by GE to prepare BWRVIP-25 (Reference 4.8.38). The analysis determined that a 5 percent to 19 percent reduction in core plate bolt preload due to thermal and irradiation effects should be expected over the 40-year life of a plant. A subsequent re-evaluation performed by GE determined that the maximum relaxation value of 19 percent is applicable to an average fluence level of 8.0E+19 n/cm^2 over the length of the bolt, determined at the peak azimuthal fluence location. Since this analysis evaluated irradiation effects expected to occur in 40 years, this analysis has been identified as a TLAA that requires evaluation for the period of extended operation.

TLAA Evaluation:

As described in Section 4.2.1, RAMA fluence projections were prepared for LSCS Units 1 and 2 for 54 EFPY for the reactor vessel beltline components and for selected reactor vessel internal components. A 54 EFPY fluence evaluation was prepared for all 34 core plate rim bolts for each unit, which determined that the bolts at the peak azimuthal location with the highest fluence for Unit 1 are bolts 7, 12, 24, and 29, which have the same fluence values due to core symmetry. For Unit 2, the bolts with the highest fluence values are bolts 4, 15, 21, and 32. The RAMA 3D fluence methodology provides more precise fluence projections than previous 2D synthesis methods, particularly for locations above or below the core, such as for these bolts which are located just below the core.

The total loss of preload in each bolt is a summation of the losses that occur throughout the length of the bolt, which varies as a function of fluence. Since the fluence tapers off from the top of the bolt to the bottom due to the increased distance from the fuel, the average fluence along the length of the bolt is used to determine the total loss of preload. Fluence projections were made at 30 discrete points equally spaced along the length of the limiting bolts at their centerline. For Unit 1, the 54 EFPY fluence value at the top centerline of the bolt is 2.66E+20 n/cm^2 and is 6.92E+16 n/cm^2 at the bottom centerline, with an average fluence value of 3.60E+19 n/cm^2. For Unit 2, the 54 EFPY fluence value at the top centerline of the bolt is 2.87E+20 n/cm^2 and is 7.04E+16 n/cm^2 at the bottom centerline, with an average fluence value of 3.85E+19 n/cm^2.

The Unit 1 average fluence value of 3.60E+19 n/cm^2 and the Unit 2 average fluence value of 3.85E+19 n/cm^2 are well below the 8.0E+19 n/cm^2 average fluence value previously evaluated in the TLAA that resulted in a maximum relaxation value of 19 percent, which had been determined to be acceptable.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analysis has been demonstrated to remain valid through the period of extended operation.

4.2.9 JET PUMP RISER BRACE CLAMP LOSS OF PRELOAD ANALYSIS

TLAA Description:

A mechanical clamping system has been designed to structurally replace two of the riser brace yoke-to-riser welds (RS-8 and RS-9) of the LaSalle Unit 1 jet pumps as a repair for crack indications in the welds. The effect of irradiation and thermal exposure on the clamping load of the jet pump riser brace clamp was included in the design evaluation assuming a 46 percent load relaxation. Load relaxation was based on relaxation curves for combined effects of thermal and neutron exposure using reactor vessel water temperatures and an end-of-life neutron fluence value of 3.2E+20 n/cm^2 at the location of the riser brace clamp. Since the neutron fluence value was based upon 40 years of operation, the analysis has been identified as a TLAA that requires evaluation for the period of extended operation.

TLAA Evaluation:

In order to evaluate the load relaxation for 60 years of operation, the neutron fluence was projected for 54 EFPY using the RAMA fluence methodology previously described in Section 4.2.1. The specific geometry of the jet pump and riser brace clamp was included in the RAMA model to improve the accuracy of the fluence projection. The 60-year fluence value at the Unit 1 jet pump riser brace clamp location during the projected service life of the repair clamp was determined to be 2.0E+20 n/cm^2, which is less than the value originally assumed in determining the load relaxation in the design analysis for the clamp. Therefore, the value for load relaxation due to neutron exposure used in the design analysis remains valid.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The jet pump riser brace clamp design analysis remains valid for the period of extended operation.

4.2.10 JET PUMP SLIP JOINT REPAIR CLAMP LOSS OF PRELOAD ANALYSIS

TLAA Description:

Jet pump slip joint repair clamps have been designed and installed in the LSCS Unit 1 RPV to minimize slip joint vibrations and wear of the jet pump assemblies. The first clamp was installed in February 2004. The clamps apply a lateral preload to the slip joint between the exit end of the inlet-mixer and the entrance end of the diffuser to dampen jet pump vibration. The specification for the clamp requires the design to account for the effect of fluence on the properties of the slip joint materials for the 40-year design life of the clamp. The repair clamp design analysis indicates that the predicted fluence for a 40-year clamp repair life is 4.4E+19 n/cm^2, which results in a total preload relaxation of 12 percent; therefore the design specification minimum clamping force of 350 pounds at end-of-life conditions will easily be met. The clamp repair life referenced is the time from expected clamp installation through the end of the 40-year license period. Since the fluence value analyzed was predicted for 40 years, the loss of preload analysis has been identified as a TLAA.

TLAA Evaluation:

In order to evaluate the clamp design analysis, the projected fluence at the clamp location inside the reactor vessel was determined for the extended service life of the clamp through the period of extended operation. RAMA 3D fluence projections were prepared that specifically modeled the limiting slip joint repair hardware location for the time period from February 2004 through the end of the period of extended operation, with a resulting fluence of 1.27E+20 n/cm^2.

In order to determine the maximum fluence that the clamp can receive before the preload is reduced to the minimum acceptable value, the maximum percent reduction in preload must be determined. The initial installed clamp preload was 500 pounds and the minimum acceptable clamp preload is 350 pounds, so a reduction of 150 pounds, or 30 percent, is acceptable.

The relationship between neutron fluence and stress relaxation for irradiated stainless steel is provided in BWRVIP-276, Figure 6-4. The allowable 30 percent stress relaxation value corresponds to a fluence value of 1.17E+20 n/cm^2, which is less than the predicted fluence for the service life of the clamp. Therefore, corrective actions must be taken prior to exceeding 1.17E+20 n/cm^2 at the clamp location, which is expected to be reached at approximately 50.7 EFPY, based upon the RAMA fluence projections described in LRA Section 4.2.1. Corrective actions may include reanalysis, repair, or replacement of the clamps.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii): License renewal commitment number 47 will be utilized to manage this TLAA and ensure that prior to exceeding the limiting fluence value of 1.17E+20 n/cm^2 at the slip joint clamp location, the analysis is updated or other corrective actions are taken to ensure the minimum preload is maintained.

4.3 METAL FATIGUE ANALYSES

NUREG-1801, Revision 2, provides a listing of components that are likely to have fatigue TLAAs within the current licensing basis that require evaluation for License Renewal. Searches were performed to identify these and any other potential fatigue TLAAs within the CLB for LSCS. Each of the potential TLAAs were evaluated with regard to the six TLAA screening criteria specified in 10 CFR 54.3. Those that were identified as LSCS TLAAs are evaluated in the following subsections:

- ASME Section III, Class 1 Fatigue Analyses (4.3.1)
- ASME Section III, Class 2 and 3 and ANSI B31.1 Allowable Stress Calculations (4.3.2)
- Environmental Fatigue Analyses for RPV and Class 1 Piping (4.3.3)
- Reactor Vessel Internals Fatigue Analyses (4.3.4)
- High-Energy Line Break (HELB) Analyses Based Upon Fatigue (4.3.5)
- MSRV Discharge Piping Fatigue Analyses (4.3.6)

4.3.1 ASME SECTION III, CLASS 1 FATIGUE ANALYSES

TLAA Description:

The LSCS reactor pressure vessel (RPV) and reactor coolant pressure boundary (RCPB) piping and components were designed in accordance with the ASME Code Section III, Class 1 design requirements. Fatigue analyses and fatigue exemptions were prepared for these components to determine the effects of cyclic loadings resulting from changes in system temperature and pressure and for seismic loading cycles. These Class 1 fatigue analyses and fatigue exemptions evaluated an explicit number and type of transients that were postulated in the design specifications to envelope the number of occurrences predicted for the 40-year design life of the plant. These Class 1 vessel and piping analyses were required to demonstrate that the Cumulative Usage Factor (CUF) for the component will not exceed the design limit 1.0 when the component is exposed to all of the postulated transients. The Class 1 valve analyses were required to demonstrate that the valves can be operated for a minimum of 2,000 thermal cycles and that the fatigue usage factor for step changes in fluid temperature, I_t, does not exceed a limit of 1.0 or the valve application must be considered severe duty.

Subsequent to the original Class 1 design analyses, the RPV, suppression chamber, MSRV discharge piping and other components were analyzed for the effects of hydrodynamic loading transients, including MSRV discharge loads and LOCA-induced pool dynamic loads, as described in UFSAR Section 3.9.1.1.2 (Reference 4.8.23). These updated analyses are the TLAAs that have been identified since they represent the current licensing basis. Since the calculation of fatigue usage factors is part of the current licensing basis and is used to support safety determinations and since the number of occurrences of each transient type was based upon 40-year assumptions, these Class 1 fatigue analyses and fatigue exemptions have been identified as Time-Limited Aging Analyses (TLAAs) requiring evaluation for the period of extended operation.

TLAA Evaluation:

The ASME Section III, Class 1 fatigue analyses for LSCS include the stress reports for the Reactor Pressure Vessel (RPV), reactor coolant pressure boundary (RCPB) piping and components, including Class 1 valves and pumps. These stress reports include fatigue analyses and fatigue exemptions, where applicable, that have been identified as TLAAs since they are based upon the numbers of transients estimated to bound 40 years of plant operation, which are the CLB fatigue design cycles. When used in Class 1 fatigue analyses, these design cycles become limits that must not be exceeded. The RPV stress reports were developed based upon the transient cycles listed in UFSAR Table 5.2-4 (Reference 4.8.17). The Class 1 piping stress reports include fatigue analyses based upon the transient cycles listed in UFSAR Table 3.9-24 (Reference 4.8.22), except that they conservatively analyzed 400 startup and shutdown cycles rather than the minimum number specified in this table. Table 4.3.1-1 lists the transients analyzed for the Unit 1 RPV and Class 1 RCPB piping systems. Table 4.3.1-2 lists the transients analyzed for the Unit 2 RPV and Class 1 RCPB piping systems. The components with fatigue exemptions are listed in LRA Table 4.3.1-3.

Each Class 1 fatigue analysis demonstrates that the cumulative usage factor (CUF) does not exceed the design Code limit of 1.0. Each fatigue exemption demonstrates that the applied cyclic loadings meet the exemption criteria of the design code and therefore do not require computation of a fatigue usage factor. The Class 1 valve analyses are required to demonstrate that the valve can operate for a minimum of 2,000 cycles and, in some cases, are required to demonstrate that the I_t value is less than 1.0 or be considered to be a severe duty application. Each of these analyses are based upon a set of design transients that were postulated to bound 40 years of operational events. The Fatigue Monitoring (B.3.1.1) program monitors the transients listed in UFSAR Tables 5.2-4 and 3.9-24 to ensure these Class 1 analyses remain valid.

In order to verify that this approach will continue to be effective through the period of extended operation, transient cycle monitoring data from the Fatigue Monitoring program was used to develop 60-year transient projections, as shown in Table 4.3.1-1 for Unit 1 and Table 4.3.1-2 for Unit 2. The first column in each table lists the transient number, the second column provides the transient description and the third column lists the cumulative numbers of cycles-to-date, including cycles that occurred during pre-operational startup testing and during all plant operations through 4/30/2013, which is the end of the baseline period for the projections. The fourth column shows the numbers of cycles projected to occur over 60 years, based upon a linear extrapolation. The fifth column shows additional cycles applied to add margin for transients with low rates of past occurrence. The sixth column shows the adjusted 60-year projections, which sums the cycles-to-date, the future cycles projected to occur through 60 years of operation, and the added margin. The seventh column lists the CLB fatigue design cycle limits, which are the numbers of cycles analyzed in the ASME Section III, Class 1 fatigue analyses.

Nearly all of the 60-year projections show that the CLB fatigue design cycle limits will not be reached by the end of the period of extended operation. However, for Unit 1, the 60-year projections for Startup and Shutdown transients slightly exceed the CLB fatigue design cycle limits for the Unit 1 RPV, but are less than the CLB fatigue design cycle limits for the Class 1 piping. The Fatigue Monitoring program will continue to be used through the period of extended operation to monitor the cumulative numbers of cycles that occur to ensure corrective action is taken prior to exceeding a design cycle limit. As part of this corrective action, the limiting locations within the Unit 1 RPV will be reanalyzed in accordance with ASME Section III design requirements using the adjusted 60-year projections listed in Table 4.3.1-1, including 130 Startup and 124 Shutdown cycles.

It should be noted that a design cycle limit does not represent a final limit; rather, the ASME Code design limit is that the Cumulative Usage Factor (CUF) may not exceed a value of 1.0. If a particular transient approaches a cycle limit, the initial corrective action would normally be to evaluate the effect of an increased number of occurrences of that transient type on the CUF of the affected components. Since the cumulative fatigue usage of a component is computed as a function of multiple thermal and pressure transients, increasing the number of cycles for one transient type may not cause the overall fatigue usage to exceed the design limit. But if the increased numbers of cycles would cause the CUF limit of 1.0 to be exceeded, the component would be reanalyzed based upon bounding numbers of cycles. Also, the actual transient severity is often less than that assumed in the design transient definitions, and evaluations of actual temperature and pressure data can be used to reduce the calculated fatigue usage for the actual events. This could be performed as part of the corrective action, increasing the remaining margin for additional cycles.

The Fatigue Monitoring program is credited with managing the ASME Section III, Class 1 TLAAs, including fatigue CUF analyses, fatigue exemptions, and Class 1 valve and pump fatigue analyses. The program includes requirements that trigger corrective action if a transient approaches a cycle limit. Corrective action may include revision of affected Class 1 fatigue analyses and fatigue exemptions to evaluate increased numbers of cycles or it may include repair or replacement of the component prior to the CUF value exceeding 1.0.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended functions of components analyzed in accordance with ASME Section III, Class 1 requirements will be managed by the Fatigue Monitoring (B.3.1.1) program for the period of extended operation.

Table 4.3.1-1
LSCS Unit 1 – 60-Year Transient Cycle Projections

Transient Number	Transient Description	Cumulative Cycles to-date (4/30/13)	60-Year Projected Cycles	Added Margin	Adjusted 60-Year Projected Cycles	CLB Fatigue Design Cycle Limits
	Normal, Upset, and Test Conditions:					
1.	Boltup	18	35	5	40	123
2.	Design Hydrostatic Test to 1,250 psig	25	49	1	50	130
3.	Startup and Heatup (100F/hr max)	100	129	1	130	117 (notes 1, 2)
4.	Daily Reduction to 75% - 100% Power Range	469	791	209	1,000	10,000
5.	Control Rod Pattern Change	224	398	2	400	400
6.	Weekly Reduction to 50% - 75% Power Range	100	194	306	500	2,000
7.	Daily Reduction to 75% - 100% Power Range and Control Rod Pattern Change	693	1,189	211	1,400	10,400
8a.	Loss of Feedwater Heaters / Turbine Trip with 25% Steam Bypass	1	2	8	10	10
8b.	Loss of Feedwater Heaters / Partial Loss of Feedwater Heater	14	28	22	50	70
9a.	Scram – Loss of Feedpumps, Main Steam Isolation Valves (MSIVs) Close	7	10	0	10	10 (note 4)

Table 4.3.1-1
LSCS Unit 1 – 60-Year Transient Cycle Projections

Transient Number	Transient Description	Cumulative Cycles to-date (4/30/13)	60-Year Projected Cycles	Added Margin	Adjusted 60-Year Projected Cycles	CLB Fatigue Design Cycle Limits
9b.	Reactor Core Isolation Cooling (RCIC) Injection with Loss of Feedpump	13	23	0	23	See limit for 9b + 9c below (notes 4,5)
9c.	High Pressure Core Spray (HPCS) Injection with Loss of Feedpump	5	6	1	7	See limit for 9b + 9c below (notes 4,5)
	Sum of Transients 9b + 9c	18	29	1	30	30 (notes 3,4)
10.	Scram – Turbine-Generator Trip, Feedwater Stays On, MSIVs Stay Open	5	10	10	20	40
11.	Scram – All Other Scrams	32	50	0	50	140
12.	Improper Start of Cold Residual Heat Removal (RHR) Shutdown Cooling	0	0	10	10	120
13.	Shutdown and Cooldown	96	124	0	124	111 (note 2)
14.	Hydrostatic Test to 1563 psi	1	1	0	1	3
15.	Unbolt	17	33	7	40	123

Table 4.3.1-1 LSCS Unit 1 – 60-Year Transient Cycle Projections						
Transient Number	**Transient Description**	**Cumulative Cycles to-date (4/30/13)**	**60-Year Projected Cycles**	**Added Margin**	**Adjusted 60-Year Projected Cycles**	**CLB Fatigue Design Cycle Limits**
16.	Natural Circulation Startup	0	0	3	3	3 (note 1)
17.	RCIC Injection Only Affecting Head Spray Nozzle	117	226	4	230	230 (notes 3,4)
18.	Operating-Basis Earthquake	0	0	1	1	1
19.	Low Pressure Core Spray (LPCS) Injection During Startup or Shutdown	3	6	24	30	40 (note 5)
20.	HPCS Injection at Rated Power	3	4	1	5	10 (notes 4,5)
21.	Main Steam Relief Valve (MSRV) Actuation	435	841	1,159	2,000	2,770 (note 6)
	Emergency and Faulted Conditions:					
22.	Emergency Scram - Reactor Overpressure with Delayed Scram, Feedwater Stays ON, MSIVs Stay Open	0	0	1	1	1
23.	Emergency Scram - Single Relief Valve or Safety Valve Blowdown	3	6	0	6	8
24.	Emergency Scram - Automatic Blowdown	0	0	1	1	1

Table 4.3.1-1
LSCS Unit 1 – 60-Year Transient Cycle Projections

Transient Number	Transient Description	Cumulative Cycles to-date (4/30/13)	60-Year Projected Cycles	Added Margin	Adjusted 60-Year Projected Cycles	CLB Fatigue Design Cycle Limits
25.	Emergency Condition - Improper Start of Cold Recirculation Loop	0	0	1	1	1
26.	Emergency Condition - Sudden Start of Recirculation Pump in Cold Recirculation Loop	0	0	1	1	1
27.	Emergency Condition – Improper Startup With Reactor Drain Shut Off Followed By Turbine Roll and Increase to Rated Power	0	0	1	1	1
28.	Emergency Condition - Pipe Rupture and Blowdown	0	0	1	1	1
29.	Faulted Condition - Safe Shutdown Earthquake	0	0	1	1	1

Note 1: The total number of startups analyzed in the RPV stress reports is 120 cycles, including 117 normal startups (event 3) and 3 natural circulation startups (event 16).

Note 2: The Class 1 piping systems were conservatively analyzed for 400 startups and 400 shutdowns.

Note 3: RCIC injections are assumed to occur during loss of Feedpump events. If they result in significant thermal and pressure fluctuations, which is defined as cyclic reactor coolant temperature changes greater than 30ºF, which are assumed to affect the reactor vessel shell and other locations beyond the Head Spray nozzle, they should be counted under the event 9b category. If the cyclic reactor coolant temperature change is 30ºF or less, the injection is considered to only affect the Head Spray nozzle, and the numbers of temperature cycles should only be applied to event 17. The limit for event 17 was derived from a reanalysis of the Head Spray nozzle flange that qualified 260 injections. 30 injection cycles are applied to event 9b, and 230 injection cycles are applied to event 17.

Note 4: Three cycles per Loss of Feedpump event were assumed in the design basis making this limit 30 cycles. In the design basis, either RCIC or HPCS was assumed to inject individually or they were both assumed to inject at the same time, resulting in three total vessel temperature changes per Loss of Feedpump event. Event 9b is defined as a RCIC injection resulting in a significant vessel temperature change that counts toward the 30 cycle limit. Event 9c is defined as a HPCS injection that also results in a significant vessel temperature change that counts toward the 30 cycle limit. Therefore the total number of events 9b and 9c combined are to be compared to the 30 cycle limit. In addition to the 30 HPCS injection cycles associated with Loss of Feedpump, the HPCS nozzle was analyzed for 10 additional injections assumed to occur while operating at rated power. These HPCS injections are counted under event 20.

Note 5: Within the Unit 1 design stress report, a single bounding analysis was prepared for the high and low pressure core spray nozzles. Each nozzle was analyzed for 10 low pressure and 40 high pressure injections. A limit of 40 low pressure core spray injections has been imposed for Unit 1 LPCS injections for consistency with the design limit for Unit 2, which was analyzed for 10 low pressure and 30 high pressure cycles.

Note 6: The number of MSRV actuations is the total number of individual valve opening cycles, which are each assumed to result in 7 stress cycles that were analyzed (Reference 4.8.40). Actuations are monitored, not stress cycles. The minimum number of actuations evaluated for the reactor vessel, containment, structures, and piping is 2,770.

Table 4.3.1-2
LSCS Unit 2 – 60-Year Transient Cycle Projections

Transient Number	Transient Description	Cumulative Cycles to-date (4/30/13)	60-Year Projected Cycles	Added Margin	Adjusted 60-Year Projected Cycles	CLB Fatigue Design Cycle Limits
	Normal, Upset, and Test Conditions:					
1.	Boltup	16	33	7	40	123
2.	Design Hydrostatic Test to 1,250 psig	19	38	5	43	130
3.	Startup and Heatup (100F/hr max)	61	112	4	116	117 (notes 1, 2)
4.	Daily Reduction to 75% - 100% Power Range	327	679	321	1,000	10,000
5.	Control Rod Pattern Change	152	315	85	400	400
6.	Weekly Reduction to 50% - 75% Power Range	94	192	308	500	2,000
7.	Daily Reduction to 75% - 100% Power Range and Control Rod Pattern Change	479	993	407	1,400	10,400
8a.	Loss of Feedwater Heaters Turbine Trip with 25% Steam Bypass	0	0	7	7	10
8b.	Loss of Feedwater Heaters Partial Feedwater Heater Bypass	6	13	37	50	70
9a.	Scram – Loss of Feedpumps, MSIVs Close	3	5	3	8	10 (note 4)

Table 4.3.1-2
LSCS Unit 2 – 60-Year Transient Cycle Projections

Transient Number	Transient Description	Cumulative Cycles to-date (4/30/13)	60-Year Projected Cycles	Added Margin	Adjusted 60-Year Projected Cycles	CLB Fatigue Design Cycle Limits
9b.	RCIC Injection with Loss of Feedpump	8	14	3	17	See limit for 9b + 9c below (notes 4,5)
9c.	HPCS Injection with Loss of Feedpump	2	4	3	7	See limit for 9b + 9c below (notes 4,5)
	Sum of Transients 9b + 9c:	10	18	6	24	30 (notes 3,4)
10.	Scram – Turbine-Generator Trip, Feedwater Stays On, MSIVs Stay Open	3	6	3	9	40
11.	Scram – All Other Scrams	26	49	1	50	140
12.	Improper Start of Cold RHR Shutdown Cooling	1	3	7	10	120
13.	Shutdown and Cooldown	60	111	0	111	111 (note 2)
14.	Hydrostatic Test to 1563 psi	2	3	0	3	3
15.	Unbolt	15	32	8	40	123

Table 4.3.1-2
LSCS Unit 2 – 60-Year Transient Cycle Projections

Transient Number	Transient Description	Cumulative Cycles to-date (4/30/13)	60-Year Projected Cycles	Added Margin	Adjusted 60-Year Projected Cycles	CLB Fatigue Design Cycle Limits
16.	Natural Circulation Startup	0	0	3	3	3 (note 1)
17.	RCIC Injection Only Affecting Head Spray Nozzle	84	161	69	230	230 (notes 3,4)
18.	Operating-Basis Earthquake Event	0	0	1	1	1
19.	LPCS Injection During Startup or Shutdown	8	17	23	40	40 (note 5)
20.	HPCS Injection at Rated Power	0	0	10	10	10 (notes 4,5)
21.	MSRV Actuations	379	688	1,312	2,000	2,770 (note 6)
	Emergency and Faulted Conditions:					
22.	Emergency Scram - Reactor Overpressure with Delayed Scram, Feedwater Stays ON, MSIVs Stay Open	0	0	1	1	1
23.	Emergency Scram - Single Relief Valve or Safety Valve Blowdown	0	0	8	8	8
24.	Emergency Scram - Automatic Blowdown	0	0	1	1	1

Table 4.3.1-2
LSCS Unit 2 – 60-Year Transient Cycle Projections

Transient Number	Transient Description	Cumulative Cycles to-date (4/30/13)	60-Year Projected Cycles	Added Margin	Adjusted 60-Year Projected Cycles	CLB Fatigue Design Cycle Limits
25.	Emergency Condition - Improper Start of Cold Recirculation Loop	0	0	1	1	1
26.	Emergency Condition - Sudden Start of Recirculation Pump in Cold Recirculation Loop	0	0	1	1	1
27.	Emergency Condition – Improper Startup With Reactor Drain Shut Off Followed By Turbine Roll and Increase to Rated Power	0	0	1	1	1
28.	Emergency Condition - Pipe Rupture and Blowdown	0	0	1	1	1
29.	Faulted Condition - Safe Shutdown Earthquake	0	0	1	1	1

Note 1: The total number of startups analyzed in the RPV stress reports is 120 cycles, including 117 normal startups (event 3) and 3 natural circulation startups (event 16).

Note 2: The Class 1 piping systems were conservatively analyzed for 400 startups and 400 shutdowns.

Note 3: RCIC injections are assumed to occur during loss of Feedpump events. If they result in significant thermal and pressure fluctuations, which is defined as cyclic reactor coolant temperature changes greater than 30º F, which are assumed to affect the reactor vessel shell and other locations beyond the Head Spray nozzle, they should be counted under the event 9b category. If the cyclic reactor coolant temperature change is 30º F or less, the injection is considered to only affect the Head Spray nozzle, and the numbers of temperature cycles should only be applied to event 17. The limit for event 17 was derived from a reanalysis of the Head Spray nozzle flange that qualified 260 injections. 30 injection cycles are applied to event 9b and 230 injection cycles are applied to event 17.

Note 4: Three cycles per Loss of Feedpump event were assumed in the design basis making this limit 30 cycles. In the design basis, either RCIC or HPCS was assumed to inject individually or they were both assumed to inject at the same time, resulting in three total vessel temperature changes per Loss of Feedpump event. Event 9b is defined as a RCIC injection resulting in a significant vessel temperature change that counts toward the 30 cycle limit. Event 9c is defined as a HPCS injection that also results in a significant vessel temperature change that counts toward the 30 cycle limit. Therefore the total number of events 9b and 9c combined are to be compared to the 30 cycle limit. In addition to the 30 HPCS injection cycles associated with Loss of Feedpump, the HPCS nozzle was analyzed for 10 additional injections assumed to occur while operating at rated power. These HPCS injections are counted under event 20.

Note 5: Within the Unit 2 design stress report, a single bounding analysis was prepared for the high and low pressure core spray nozzles. Each nozzle was analyzed for 10 low pressure and 40 high pressure injections. A limit of 40 low pressure core spray injections has been imposed for Unit 1 LPCS injections for consistency with the design limit for Unit 2, which was analyzed for 10 low pressure and 30 high pressure cycles.

Note 6: The number of MSRV actuations is the total number of individual valve opening cycles, which are each assumed to result in 7 stress cycles that were analyzed (Reference 4.8.40). Actuations are monitored, not stress cycles. The minimum number of actuations evaluated for the reactor vessel, containment, structures, and piping is 2,770.

Table 4.3.1-3 RPV Components Exempt Per ASME Section III, N-415.1
a) Unit 1 Vent Nozzle (N-8)
b) Unit 1 and 2 Instrument Nozzles (N12, N13, & N14)
c) Unit 1 Jet Pump Instrument Nozzle
d) Unit 1 Drain Nozzle
e) Unit 1 and 2 Steam Dryer Support brackets
f) Unit 1 and 2 Guide Rod Brackets
g) Unit 1 and 2 Core Spray Sparger Brackets
h) Unit 1 and 2 Steam Dryer Hold-down Brackets
i) Unit 1 and 2 Feedwater Sparger Brackets
j) Unit 1 and 2 Top Head Lifting Lug

4.3.2 ASME SECTION III, CLASS 2 & 3 AND ANSI B31.1 ALLOWABLE STRESS ANALYSES

TLAA Description:

Piping systems designed in accordance with ASME Section III, Class 2 or 3 design rules or ANSI B31.1 Piping Code design rules are not required to have an explicit analysis of cumulative fatigue usage, but cyclic loading is considered in a simplified manner in the design process. These codes first require prediction of the overall number of thermal and pressure cycles expected during the 40-year lifetime of these components. Then a stress range reduction factor is determined for that number of cycles using a table from the applicable design code, similar to Table 4.3.2-1 below. If the total number of cycles is 7,000 or less, the stress range reduction factor of 1.0 is applied, which would not reduce the allowable stress value. For higher numbers of cycles, a stress range reduction factor of less than 1.0 is applied that limits the allowable stresses applied to the piping, which in turn reduces the alternating stress range, reducing the likelihood of failure due to cyclic loading. These are considered to be implicit fatigue analyses since they are based upon cycles anticipated for the life of the component and are therefore TLAAs requiring evaluation for the period of extended operation.

Table 4.3.2-1
Stress Range Reduction Factors for ASME Section III, Class 2 and 3 and ANSI B31.1 Piping

Number of Equivalent Full Temperature Cycles	Stress Range Reduction Factor
7,000 and less	1.0
7,000 to 14,000	0.9
14,000 to 22,000	0.8
22,000 to 45,000	0.7
45,000 to 100,000	0.6
100,000 and over	0.5

TLAA Evaluation:

Portions of the following license renewal systems were designed in accordance with ASME Section III, Class 2 or 3 or ANSI B31.1 requirements, but are attached to ASME Section III, Class 1 piping and are affected by the same thermal and pressure transients as the Class 1 systems: Residual Heat Removal, High Pressure Core Spray, Low Pressure Core Spray, Reactor Core Isolation Cooling, Reactor Water Cleanup, Control Rod Drive, Main Steam, Feedwater, and Condenser and Air Removal.

The 60-year projections for the transient types that affect these piping systems demonstrate that the total number of cycles through the period of extended operation will not exceed the total number of design cycles, which was initially used to determine the applicable stress reduction factor. Therefore, the stress range reduction factors originally selected for the components within these systems remain applicable and these TLAAs will remain valid through the period of extended operation.

The remaining systems designed in accordance with ASME Section III, Class 2 or 3 or ANSI B31.1 requirements are affected by different thermal and pressure cycles related to their specific operations, including portions of the Reactor Core Isolation Cooling, Fire Protection, and Diesel Generator and Auxiliaries systems. An operational review was performed for each system to determine the numbers of cycles that have occurred in the past and to project the total numbers of cycles that will occur through the period of extended operation. This includes cycles during unit pre-operational testing, plant operational cycles, and periodic surveillance test cycles, as applicable. For each of these systems, the review concluded that the total number of cycles, projected for 60 years, will not exceed 7,000 cycles. Therefore, since the stress range reduction factors originally selected for the components within these systems remain applicable, the TLAAs remain valid for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The ASME Section III, Class 2 and 3 and ANSI B31.1 allowable stress calculations remain valid for the period of extended operation.

4.3.3 ENVIRONMENTAL FATIGUE ANALYSES FOR RPV AND CLASS 1 PIPING

TLAA Description:

NUREG-1800, Revision 2, provides a recommendation for evaluating the effects of the reactor water environment on the fatigue life of ASME Section III Class 1 components that contact reactor coolant. It states that one method acceptable to the staff for satisfying this recommendation is to assess the impact of the reactor coolant environment on a sample of critical components. These critical components should include those listed in NUREG/CR-6260 (Reference 4.8.13) for the plant type and vintage. Applicants should also consider additional component locations if they are considered to be more limiting than those listed in NUREG/CR-6260 for the plant.

TLAA Evaluation:

Environmental fatigue calculations were prepared for each component location listed in NUREG/CR-6260 for the newer-vintage BWR, which correlates to the GE BWR-5 reactor pressure vessels at LSCS. In order to ensure that any other locations that may not be bounded by the NUREG/CR-6260 locations were evaluated, environmental fatigue calculations were performed for each RPV component location that has a reported CUF value in the stress report. An environmental fatigue analysis was also prepared for each ASME Section III, Class 1 system (or group of systems that are affected by the same transients) that normally contact liquid reactor coolant. These environmental fatigue calculations were prepared for the limiting location for each material within the component or system that contacts reactor coolant. The location with the highest ASME CUF value within the stress report for each material type is considered limiting.

Table 4.3.3-1 and 4.3.3-2 show the results from the environmental fatigue calculations for the RPV components. Table 4.3.3-3 and 4.3.3-4 show the results for the Class 1 piping systems. The piping tables use plant-specific Class 1 piping system names for clarity, but they are all included in the Reactor Coolant Pressure Boundary license renewal system. The locations corresponding to those identified in NUREG/CR-6260 for newer-vintage BWR plants are noted in the tables.

NUREG-1800, Revision 2, specifies options for evaluating environmental effects. The formulae specified in the option listed below for each material were used in evaluating the LSCS components for environmental effects:

<u>Carbon and Low Alloy Steels</u>

- Those provided in Appendix A of NUREG/CR-6909 (Reference 4.8.14), using the fatigue design curve for carbon and low alloy steel provided in NUREG/CR-6909 (Figure A.1 and A.2, respectively, and Table A.1).

<u>Austenitic Stainless Steels</u>

- The formula provided in NUREG/CR-6909, using the fatigue design curve for austenitic stainless steel provided in NUREG/CR-6909 (Figure A.3 and Table A.2).

Nickel Alloys

- The formula provided in NUREG/CR-6909, using the fatigue design curve for austenitic stainless steel provided in NUREG/CR-6909 (Figure A.3 and Table A.2).

For each wetted material within a system, a new CUF value was computed using the applicable NUREG/CR-6909 fatigue curve, based upon the alternating stress values from the current ASME Code fatigue analysis or from a further refined analysis when necessary. The F_{en} multipliers were computed based upon the applicable formula provided in NUREG/CR-6909 for each material. For stainless steel materials, NUREG/CR-6909 specifies a single transformed dissolved oxygen value to be used in determining the F_{en} multipliers, so it was applied for all conditions. For nickel alloy materials, NUREG/CR-6909 specifies one transformed dissolved oxygen value for Normal Water Chemistry (NWC) conditions and another for Hydrogen Water Chemistry (HWC) conditions.

For carbon and low-alloy steel components, dissolved oxygen values were determined for different regions within the reactor pressure vessel and Class 1 piping systems using the EPRI BWRVIA radiolysis computer model (Reference 4.8.21). The model is designed to predict dissolved oxygen concentrations, dissolved hydrogen at various locations within the reactor vessel based upon chemical sampling and monitoring data. The reactor coolant dissolved oxygen values were significantly reduced by hydrogen water chemistry and noble metal injection strategies employed for each unit, which were accounted for in the determination of the F_{en} multipliers. Each unit was initially operated using Normal Water Chemistry (NWC), followed by the current strategy of simultaneously employing HWC plus Noble Metal Chemical Addition (NMCA). Dissolved oxygen values were determined for each of these operating regimes (NWC and HWC + NMCA) for each region of the reactor vessel and for each affected Class 1 piping system.

For each unit, the overall percentage of time the plant will have operated within each water chemistry regime by the end of the period of extended operation was determined based upon a review of plant chemistry records. Unit 1 will have operated under NWC conditions for 29.8 percent of the time and HWC + NMCA conditions for 70.2 percent of the time. Unit 2 will have operated under NWC conditions for 26.5 percent of the time and HWC + NMCA conditions for 73.5 percent of the time. One multiplier was computed for each water chemistry regime and the results were applied based on the percentage of time during 60 years of operation that the regime was in effect, excluding refueling outage periods when environmental effects are not applicable.

The bounding sulfur value was also assumed for each material. Separate F_{en} multipliers were computed for each location using the dissolved oxygen value appropriate for each chemistry regime. These separate F_{en} multipliers were then combined into an overall F_{en} multiplier based on a time-weighted average using these percentages.
For all materials, additional refinements were performed when necessary to obtain satisfactory results in the fatigue usage computation. One such refinement method was to separate lumped transients into separate pairings so that the alternating stresses applicable to each transient pair were used instead of applying the bounding alternating stress to all events. A refined F_{en} multiplier could then be developed for the individual transient pairs based upon the temperature and strain rate assumptions appropriate for the individual pairing. If necessary, the adjusted 60-year projected cycles shown in Tables

4.3.1-1 and 4.3.1-2 were used as inputs in the environmental fatigue analyses. These values will be imposed as administrative cycle limits in the Fatigue Monitoring (B.3.1.1) program to ensure that these reduced values are not exceeded. Prior to exceeding an administrative cycle limit, corrective action will be taken, which may include revision of the affected environmental fatigue analysis to qualify an increased number of cycles determined to bound 60 years of operation.

For Class 1 piping systems, the limiting location for each wetted material type was identified as the location with the highest ASME CUF value within the system(s) or subsystem(s) affected by the same transient definitions, as defined on the applicable thermal cycle diagram. The limiting Class 1 piping location was evaluated (or bounded) for each system. The fatigue usage value from the limiting piping location for each system was compared to the fatigue usage values for the Class 1 valves, pumps, and containment penetrations within that system. With the exception of the Feedwater system valves, all of the Class 1 valves, pumps, and containment penetration fatigue usage values were bounded by the fatigue usage value of the limiting piping location for the system. The Fatigue Monitoring (B.3.1.1) program will be enhanced to evaluate any Class 1 components that are not bounded by the piping or reactor vessel environmental fatigue analyses prior to the period of extended operation, including the Feedwater system Class 1 valves.

The F_{en} factors were applied to the 60-year CUF values and the resulting 60-year CUF_{en} values do not exceed the design Code limit of 1.0, as shown in Tables 4.3.3-1 through 4.3.3-4. The NUREG/CR-6260 locations are noted in the tables. In several cases, a single RPV location was analyzed for environmental fatigue, but the analysis also represents another RPV location that is bounded. Likewise, in some cases, one Class 1 piping location was evaluated for environmental fatigue but the analysis also represents another piping location that is bounded. The bounded location must be affected by the same transients as the analyzed location, must have a lower ASME CUF than the ASME CUF value of the analyzed location, and must either be made from the same material or, if of a different material, the bounded material must have a lower F_{en} value than the bounding material. Notes are provided below each table providing the basis for the bounding determination when applicable.

> Note: There is an additional fatigue usage value included in the feedwater nozzle fatigue evaluation that needs to be explained. The RPV feedwater nozzle design includes a thermal sleeve that is press fit into the nozzle bore. The outer surface of the thermal sleeve includes two grooves that contain metal seals that ensure all of the feedwater flow passes through the thermal sleeve, protecting the hot nozzle forging from the relatively cold feedwater. The feedwater nozzle analysis assumes these seals may begin to slowly wear over long periods of time and eventually permit small amounts of feedwater to pass between the seal and the nozzle, creating a very rapid but small thermal cycle. These effects are analyzed separately and added to the fatigue usage computed for the design transients. Due to the very short duration of these cycles, there is inadequate time for environmental effects to be applicable to this fatigue contribution. Therefore, the rapid cycling contribution is added separately, as shown in Tables 4.3.3-1 and 4.3.3-2.

The environmental fatigue analyses described within this section will be incorporated into the CLB prior to the period of extended operation. The environmental fatigue analyses will be managed by the Fatigue Monitoring program in the same manner as the Class 1 analyses. The program will ensure that the cumulative number of occurrences of each transient type is maintained below the number of cycles used in the most limiting fatigue analysis, including these environmental fatigue analyses. Prior to the period of extended operation, the Fatigue Monitoring program will be enhanced to incorporate an administrative transient cycle limit for each transient type where the number of cycles analyzed for reactor water environmental effects is less than the current 40-year design cycle limit. These administrative limits will be treated the same as design limits that must not be exceeded.

If a cycle limit is approached, corrective actions are triggered to prevent exceeding the limit. The fatigue analyses may be revised to account for increased numbers of cycles such that the CUF value does not exceed the Code design limit of 1.0, including environmental effects where applicable. Environmental fatigue analyses will be reviewed and updated if necessary to ensure the liming locations have been satisfactorily evaluated for reactor water environmental effects.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The effects of environmental fatigue on the intended functions of Class 1 components will be adequately managed for the period of extended operation by the Fatigue Monitoring (B.3.1.1) program.

Table 4.3.3-1
LSCS Unit 1 - (CE) Reactor Pressure Vessel (RPV) Environmental Fatigue Analysis Results

RPV Component	Node	Material	60-yr 6909 CUF	6909 F_{en}	60-year CUF_{en}
Reactor Vessel Shell – Closure Shell-Hub Junction - (note 1)	Element 1, Cut I, surf a.	Low Alloy Steel	0.0837	8.99	0.7529
Reactor Vessel Shell – Shell Section Change - (note 1)	Shell 2, Cut II, surf. b	Low Alloy Steel	0.0328	8.99	0.2950
Bottom Head Support Skirt (Vessel ID at attachment location) - (note 1)	Strut B, Part 4-5 Loc. 19	Low Alloy Steel	0.0472	6.19	0.2922
Shroud Support – Shroud/Cylinder Junction	Cut 1	Stainless Steel	0.0087	11.07	0.0967
Shroud Support - Cylinder/Plate Junction	Cut 3	Nickel Alloy	0.0124	3.49	0.0433
Shroud Support - Bottom Head - (note 1)	N/A	Low Alloy Steel	0.0108	6.86	0.0738
N1 Recirculation Outlet Nozzle - Safe End - (note 3)	Keypoint 13	Stainless Steel	0.0028	11.07	0.0311
N1 Recirculation Outlet Nozzle - Nozzle-Vessel Intersection - (note 3)	Keypoint 26i	Low Alloy Steel	0.0218	6.86	0.1494
N2 Recirculation Inlet Nozzle – Nozzle/Vessel Intersection - (note 3)	Node 33	Low Alloy Steel	0.0421	6.86	0.2886
N3 Steam Outlet Nozzle – Safe End	Node 18	Carbon Steel	0.0447	8.39	0.3750
N3 Steam Outlet Nozzle – Nozzle/Vessel Intersection	Node 35i	Low Alloy Steel	0.0447	8.99	0.4022
N4 Feedwater Nozzle - Safe End - (note 2)	Node 1641	Carbon Steel	0.0011	1.88	0.0021 + 0.0001 rapid cycling =0.0022
N4 Feedwater Nozzle - Safe End Primary Seal Inlay - (note 2)	Node 298	Stainless Steel	0.3486	2.67	0.9320
N4 Feedwater Nozzle - Nozzle Blend Radius - (note 2)	Node 1065	Low Alloy Steel	0.0091	8.64	0.0788 + 0.0084 rapid cycling =0.0872
N5 Low Pressure Core Spray Nozzle – Pipe End - (note 4)	Node 80	Carbon Steel	0.1518	3.44	0.5229
N5 Low Pressure Core Spray Nozzle – Pipe End - (note 4)	Cut 13i	Nickel Alloy	0.1633	2.48	0.4044

Table 4.3.3-1 LSCS Unit 1 - (CE) Reactor Pressure Vessel (RPV) Environmental Fatigue Analysis Results					
RPV Component	**Node**	**Material**	**60-yr 6909 CUF**	**6909 F_{en}**	**60-year CUF_{en}**
N5 Low Pressure Core Spray Nozzle – Nozzle/Vessel Intersection - (note 4)	Node 32i	Low Alloy Steel	0.0122	7.66	0.0933
N6 RHR/LPCI Nozzle - Pipe End - (note 5)	Section 2	Carbon Steel	0.2231	4.36	0.9732
N6 RHR/LPCI Nozzle - Pipe End - (note 5)	Section 2	Nickel Alloy	0.2250	2.77	0.6223
N6 RHR/LPCI Nozzle - Nozzle-Vessel Intersection - (note 5)	Node 24i	Low Alloy Steel	0.0146	7.66	0.1117
N7 Head Spray Nozzle Outer Flange	Node 366	Stainless Steel	0.4527	2.21	0.9986
N10 CRD Return Nozzle - Safe End	Node 10i	Stainless Steel	0.0257	11.07	0.2841
N10 CRD Return Nozzle – Nozzle/Vessel Intersection	Node 29i	Low Alloy Steel	0.0918	7.66	0.7033
N11 Core ∆P Nozzle	Cut 1	Nickel Alloy	0.3058	2.68	0.8186
N11 Core ∆P Nozzle	Cut 3	Low Alloy	0.0351	6.19	0.2172
N11 Core ∆P Nozzle	Cut 4	Stainless Steel	0.0001	9.26	0.0009
N12, N13, and N14 Instrument Nozzles	N/A	N/A	N/A	N/A	Exempt in Design Stress Report
N15 Drain Nozzle	N/A	N/A	N/A	N/A	Exempt in Design Stress Report
N16 High Pressure Core Spray Nozzle – Pipe End - (note 4)	Node 80	Carbon Steel	0.1195	4.15	0.4963
N16 High Pressure Core Spray Nozzle – Pipe End - (note 4)	Cut 13i	Nickel Alloy	0.1233	2.70	0.3324
N16 High Pressure Core Spray Nozzle – Nozzle / Vessel Intersection - (note 4)	Node 32i	Low Alloy Steel	0.0120	7.66	0.0922
N17 Seal Leak Detection Nozzle	N/A	N/A	N/A	N/A	Not Analyzed for Cyclic Operation in Stress Report

Table 4.3.3-1
LSCS Unit 1 - (CE) Reactor Pressure Vessel (RPV) Environmental Fatigue Analysis Results

RPV Component	Node	Material	60-yr 6909 CUF	6909 F_{en}	60-year CUF_{en}
N18 Spare Nozzle	N/A	N/A	N/A	N/A	Exempt in Design Stress Report
N19 CRD Penetration	Cut 13i	Stainless Steel	0.0308	9.26	0.2853
N19 CRD Nozzle - Stub Tube	Node 14	Nickel Alloy	0.3058	2.68	0.8186
N20 In-Core Instrument Nozzle	N/A	N/A	N/A	N/A	Exempt in Design Stress Report

Notes 1 – 5: These notes correspond to component listings 1 – 5 specified in NUREG/CR-6260, Section 5.6 (Reference 4.8.13) for the RPV locations in a Newer Vintage General Electric Plant.

Table 4.3.3-2
LSCS Unit 2 - (CB&I) Reactor Pressure Vessel (RPV) Environmental Fatigue Analysis Results

RPV Component	Node	Material	60-year 6909 CUF	6909 F_{en}	60-year CUF_{en}
Reactor Vessel Shell and Flanges - (note 1)	Flange	Low Alloy Steel	0.2476	4.03	0.9989
Stabilizer Bracket - Steam/Water Interface - (note 1)	Point 6 (vessel ID)	Low Alloy Steel	0.2371	4.21	0.9971
Support Skirt – Shell (Vessel ID at attachment location) - (note 1)	Point 18	Low Alloy Steel	0.0015	5.99	0.0092
Shroud Support - Baffle Plate	Point 11	Nickel Alloy	0.0531	3.75	0.1990
Shroud Support - Shell/Bottom Head - (note 1)	Point 18	Low Alloy Steel	0.0215	5.99	0.1287
N1 Recirculation Outlet Nozzle – Clad/Safe End - (note 3)	Point 13	Stainless Steel	0.0343	11.07	0.3799
N1 Recirculation Outlet Nozzle – Forging - (note 3)	N/A	Low Alloy Steel	0.0641	6.59	0.4223
N1 Recirculation Outlet Nozzle - Nozzle-Vessel Intersection - (note 3)	Point 4	Low Alloy Steel	0.0584	6.59	0.3851
N2 Recirculation Inlet Nozzle – Clad - (note 3)	Point 1	Stainless Steel	0.0229	11.07	0.2531
N2 Recirculation Inlet Nozzle – Nozzle/Vessel Intersection - (note 3)	N/A	Low Alloy Steel	0.1945	5.02	0.9758
N2 Recirculation Inlet Nozzle – Nozzle Forging / Reinforcement - (note 3)	Point 4	Low Alloy Steel	0.0847	6.59	0.5582
N3 Steam Outlet Nozzle – Safe End	Point 4	Carbon Steel	0.0402	1.74	0.0699
N3 Steam Outlet Nozzle – Forging	Point 10	Low Alloy Steel	0.5207	1.52	0.7902
N3 Steam Outlet Nozzle – Nozzle/Vessel Intersection	N/A	Low Alloy Steel	0.1932	1.84	0.3552
N4 Feedwater Nozzle - Safe End - (note 2)	Node 1641	Carbon Steel	0.0011	1.88	0.0021 + 0.0001 rapid cycling = 0.0022
N4 Feedwater Nozzle - Safe End Primary Seal Inlay - (note 2)	Node 298	Stainless Steel	0.3486	2.67	0.9320

Table 4.3.3-2
LSCS Unit 2 - (CB&I) Reactor Pressure Vessel (RPV) Environmental Fatigue Analysis Results

RPV Component	Node	Material	60-year 6909 CUF	6909 F_{en}	60-year CUF_{en}
N4 Feedwater Nozzle - Nozzle Blend Radius - (note 2)	Node 1065	Low Alloy Steel	0.0091	8.64	0.0788 + 0.0084 rapid cycling = 0.0872
N5 Low Pressure Core Spray Nozzle – Safe End-to-Piping Weld - (note 4)	Point 22	Carbon Steel	0.1176	2.84	0.3338
N5 Low Pressure Core Spray Nozzle – Forging - (note 4)	Point 3	Low Alloy Steel	0.0023	4.09	0.0094
N5 Low Pressure Core Spray Nozzle – – Nozzle/Vessel Intersection - (note 4)	N/A	Low Alloy Steel	0.1945	5.02	0.9758
N5 Low Pressure Core Spray Nozzle – Thermal Sleeve - (note 4)	Point 13	Nickel Alloy	0.3679	2.51	0.9239
N5 Low Pressure Core Spray Nozzle – Thermal Sleeve - (note 4)	Point 16	Stainless Steel	0.0433	3.50	0.1515
N6 RHR/LPCI Nozzle - Safe End - (note 5)	Point 3	Nickel Alloy	0.1090	2.97	0.3237
N6 RHR/LPCI Nozzle - Safe End-to-Piping Weld - (note 5)	Point 1	Carbon Steel	0.0459	4.00	0.1834
N6 RHR/LPCI Nozzle - Forging - (note 5)	Point 20	Low Alloy Steel	0.0345	3.73	0.1286
N6 RHR/LPCI Nozzle - Nozzle-Vessel Intersection - (note 5)	N/A	Low Alloy Steel	0.1945	5.02	0.9758
N6 RHR/LPCI Nozzle – Thermal Sleeve - (note 5)	Point 17	Stainless Steel	0.0357	5.63	0.2011
N7 Head Spray Nozzle – Outer Flange	Node 376IJ	Stainless Steel	0.4527	2.21	0.9986
N9 Jet Pump Instrument Nozzle	N/A	Low Alloy Steel	N/A	N/A	Bounded by N1 Recirc. Outlet Nozzle (note 7)
N10 CRD Return Nozzle – Safe End	Point 23	Stainless Steel	0.0915	9.26	0.8473
N10 CRD Return Nozzle – Nozzle/Vessel Intersection	N/A	Low Alloy Steel	0.1945	5.02	0.9758

Table 4.3.3-2
LSCS Unit 2 - (CB&I) Reactor Pressure Vessel (RPV) Environmental Fatigue Analysis Results

RPV Component	Node	Material	60-year 6909 CUF	6909 F_{en}	60-year CUF_{en}
N11 Core ∆P Nozzle	N/A	Nickel Alloy	0.1933	3.75	0.7245
N12, N13, and N14 Instrument Nozzles	N/A	N/A	N/A	N/A	Bounded by N19 CRD Penetration (note 8)
N15 Drain Nozzle	N/A	N/A	N/A	N/A	Bounded by N4 Feedwater Nozzle (note 9)
N16 High Pressure Core Spray – Safe End-to-Piping Weld - (note 4)	Point 22 N/A	Carbon Steel	0.1006	3.58	0.3598
N16 High Pressure Core Spray Nozzle – Forging - (note 4)	Point 3	Low Alloy Steel	0.0021	3.95	0.0083
N16 High Pressure Core Spray Nozzle – Nozzle / Vessel Intersection - (note 4)	N/A	Low Alloy Steel	0.1945	5.02	0.9758
N16 High Pressure Core Spray Nozzle – Thermal Sleeve - (note 4)	Point 13	Nickel Alloy	0.3148	2.84	0.8950
N16 High Pressure Core Spray Nozzle – Thermal Sleeve - (note 4)	Point 16	Stainless Steel	0.0868	4.80	0.1766
N17 Seal Leak Detection Nozzle	N/A	N/A	N/A	N/A	Not Analyzed for Cyclic Operation (note 10)
N19 CRD Penetration	N/A	Stainless Steel	0.1733	5.26	0.9118
N19 CRD Penetration – Stub Tube-to-Vessel Weld	N/A	Nickel Alloy	0.1275	3.75	0.4778
N20 In-Core Housing Penetration	Element 152	Stainless Steel	0.067	9.26	0.6360

Notes 1 – 5: These notes correspond to component listings 1 – 5 specified in NUREG/CR-6260, Section 5.6 (Reference 4.8.13) for the RPV locations in a Newer Vintage General Electric Plant.

Note 7: In the original CB&I RPV stress report, there was no CUF value reported for the Jet Pump Instrument Nozzle. The report concluded that it is bounded by the fatigue analysis of the N1 Recirculation Outlet Nozzle. Therefore, no separate environmental fatigue analysis was performed.

Note 8: In the original CB&I RPV stress report, there was no CUF value reported for the N12, N13, and N14 Instrument Nozzles. The report concluded that they are bounded by the fatigue analysis of the N19 CRD Penetration. Therefore, no separate environmental fatigue analysis was performed.

Note 9: In the original CB&I RPV stress report, there was no CUF value reported for the N15 Drain Nozzle. The report concluded that it is bounded by the fatigue analysis of the N4 Feedwater Nozzle. Therefore, no separate environmental fatigue analysis was performed.

Note 10: In the original CB&I RPV stress report, there was no CUF value reported for the N17 Seal Leak Detection Nozzle since it was not analyzed for cyclic operation. Therefore, no environmental fatigue analysis was performed.

Table 4.3.3-3
LSCS Unit 1 - Class 1 Piping System Environmental Fatigue Analysis Results

Piping System	Location	Node	Material	60-Year 6909 CUF	F_{en}	CUF_{en}
Reactor Recirculation Piping 1RR-01 - (note 3)	SW Coupling	1071	Stainless Steel	N/A	N/A	Bounded by 1RH-01 Piping (note 11)
Low Pressure Core Spray Injection Piping 1LP-01 - (note 4)	RPV Nozzle	5	Carbon Steel	0.105	8.36	0.878
High Pressure Core Spray Injection Piping 1HP-01 - (note 4)	RPV Nozzle	5	Carbon Steel	0.019	8.37	0.159
RHR Supply and Return Piping 1RH-01 - (note 5)	Valve End	55	Stainless Steel	0.308	3.04	0.937
Feedwater 1FW-01 - (note 6)	RPV Safe End	A100	Carbon Steel	0.413	1.89	0.776
Standby Liquid Control (SLC) 1SC-02	Elbow	70	Stainless Steel	0.226	2.08	0.471
Reactor Core Isolation Cooling 1RI-03	6" Sch 160 LR Elbow	10A	Carbon Steel	N/A	N/A	Bounded by RPV N7 Head Spray Nozzle Outer Flange (note 12)

Notes 3 – 6: These notes correspond to component listings 3 – 6 specified in NUREG/CR-6260, Section 5.6 (Reference 4.8.13) for the Class 1 piping locations in a Newer Vintage General Electric Plant.

Note 11: The stainless steel location 1071 in analysis 1RR-01 has an ASME CUF value of 0.173, which is bounded by the stainless steel location 55 in analysis 1RH-01 which has an ASME CUF value of 0.954. Therefore, the environmental fatigue analysis for the 1RH-01 piping system bounds the 1RR-01 piping system.

Note 12: The carbon steel location 10A in analysis 1RI-03 has an ASME CUF value of 0.912, which is the same as the ASME CUF value of 0.912 applicable for stainless steel location 376IJ in the N7 Head Spray Nozzle analysis. Since the F_{en} multipliers for stainless steel are higher than those for carbon steel, the environmental fatigue analysis for the N7 Head Spray nozzle provided in Table 4.3.3-1 bounds the 1RI-03 piping system.

Table 4.3.3-4
LSCS Unit 2 - Class 1 Piping System Environmental Fatigue Analysis Results

Piping System	Location	Node	Material	6909 CUF	6909 F_{en}	CUF_{en}
Reactor Recirculation Piping - 2RR-01 - (note 3)	SW Half Coupling	B390	Stainless Steel	0.2866	3.36	0.9625
Low Pressure Core Spray Injection Piping - 2LP-01 - (note 4)	RPV Nozzle Safe End	Node 5	Carbon Steel	N/A	N/A	Bounded by RPV N5 LPCS Nozzle (note 13)
High Pressure Core Spray Injection Piping – 2HP-01 (note 4)	RPV Nozzle Safe End	Data Point 5	Carbon Steel	N/A	N/A	Bounded by the RPV N16 HPCS Nozzle Safe End-to-Piping Weld (note 14)
RHR Supply and Return Piping - 2RH-01 - (note 5)	Valve End	55	Stainless Steel	0.2004	2.98	0.5969
Feedwater Piping - 2FW-02 - (note 6)	Half Coupling	A113	Carbon Steel	0.4180	1.88	0.7858
Reactor Water Cleanup Suction Piping 2RT-05	Valve End	830	Stainless Steel	N/A	N/A	Bounded by 2RR-01 Reactor Recirculation Suction Piping (note 15)
Standby Liquid Control (SLC) Piping – 2SC-01C	Elbow	320	Stainless Steel	0.1300	2.08	0.2704
Reactor Core Isolation Cooling Piping - 2RI-03	6” Sch 120 Short Radius Elbow	Data Point 10A	Stainless Steel and Carbon Steel	N/A	N/A	Bounded by RPV N7 nozzle (note 16)

Notes 3 – 6: These notes correspond to component listings 3 – 6 specified in NUREG/CR-6260, Section 5.6 (Reference 4.8.13) for the Class 1 piping locations in a Newer Vintage General Electric Plant.

Note 13: The carbon steel location 05 in analysis 2LP-01 has an ASME CUF value of 0.276, which is bounded by the carbon steel RPV nozzle safe end-to-pipe weld point 22, which has an ASME CUF value of 0.323. Therefore, the environmental fatigue analysis of the N5 RPV nozzle safe end-to-pipe weld provided in Table 4.3.3-2 is bounding for the 2LP-01 piping system

Note 14: The carbon steel location 5 in analysis 2HP-01 has an ASME CUF value of 0.165, which is bounded by the carbon steel N16 RPV nozzle safe end-to-pipe weld point 22, which has an ASME CUF value of 0.323. Therefore, the environmental fatigue analysis of the N16 RPV nozzle safe end-to-pipe weld provided in Table 4.3.3-2 is bounding for the 2HP-01 piping system.

Note 15: The stainless steel location 830 in analysis 2RT-05 has an ASME CUF value of 0.035, which is bounded by the ASME CUF value of 0.716 for the stainless steel Node B390 in analysis 2RR-01. Since the CUF value is higher and since the F_{en} multiplier for stainless steel is higher than the multiplier for carbon steel, the environmental fatigue analysis for the 2RR-01 piping system bounds the 2RT-01 piping system.

Note 16: Node 10A in analysis 2RI-03 is a bi-metallic weld (the two materials are SA-182 F304 stainless steel and SA-106B carbon steel), with an ASME CUF value of 0.837, which is bounded by the ASME CUF value of 0.912 for stainless steel location 376IJ in the N7 Head Spray Nozzle analysis. Since the CUF value is higher and since the F_{en} multiplier for stainless steel is higher than the multiplier for carbon steel, the environmental fatigue analysis for the N7 Head Spray nozzle provided in Table 4.3.3-2 bounds the 2RI-03 piping system.

4.3.4 REACTOR VESSEL INTERNALS FATIGUE ANALYSES

TLAA Description:

LSCS reactor internals were designed and procured prior to the issuance of ASME Section III, Subsection NG. However, an earlier draft of the ASME Code was used as a guide in the design of the reactor internals. Subsequent to the issuance of Subsection NG, comparisons were made that ensure the pre-NG design meets the equivalent level of safety as presented by Subsection NG. These fatigue analyses have been identified as TLAAs that require evaluation for the period of extended operation.

TLAA Evaluation:

Table 4.3.4-1 identifies the LaSalle Unit 1 and 2 reactor vessel internal components that have been analyzed for fatigue. The bounding CUF value from Unit 1 or Unit 2 at 40 years is listed alongside each component. Internal components welded to the inside of the RPV pressure boundary were analyzed in the Unit 1 and Unit 2 RPV stress reports and are not included below.

Table 4.3.4-1
Reactor Vessel Internals Fatigue Analyses

Internals Component	Bounding CUF Value from Unit 1 and Unit 2
Shroud Support	0.089
Shroud	0.7
Core Plate	0.273
Top Guide	0.365
Control Rod Drive Housing	0.82
Control Rod Guide Tube	Meets exemption criteria of ASME Section III, NG-3222.4(d)
Orificed Fuel Support	Meets exemption criteria of ASME Section III, NG-3222.4(d)
Feedwater Sparger	0.88
Jet Pump Assembly	0.96
Core Spray Line (in-vessel) and Sparger	0.969
Access Hole Cover	0.33

Table 4.3.4-1 Reactor Vessel Internals Fatigue Analyses	
Internals Component	**Bounding CUF Value from Unit 1 and Unit 2**
Shroud Head and Steam Separator Assembly	0.91
In-Core Housing and Guide Tube	Meets exemption criteria of ASME Section III, NG-3222.4(d)
Core Differential Pressure and Liquid Control Line	0.020
LPCI Coupling	< 1.0

The fatigue analyses and fatigue exemptions performed for the reactor internals components are TLAAs that are based upon the same set of design transients as those used in the fatigue analyses for the reactor pressure vessel. The original analyses were updated to consider the hydrodynamic loading effects resulting from LOCA events and MSRV discharge loads. This includes condensation oscillation and chugging cycles that would result from a Loss of Coolant Accident (LOCA). The analyses have been updated as necessary to reflect the impact of operational occurrences and power uprates throughout the design life of the plant.

The Fatigue Monitoring program will be used to manage fatigue of these components through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). The program monitors the design transients used as inputs in these analyses, including the LOCA events and the MSRV discharge loads. The hydrodynamic loading cycles are a subset of the LOCA events.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The reactor vessel internals fatigue analyses will be managed by the Fatigue Monitoring (B.3.1.1) program through the period of extended operation.

4.3.5 HIGH-ENERGY LINE BREAK (HELB) ANALYSES BASED ON FATIGUE

TLAA Description:

High Energy Line Break (HELB) analyses for LSCS used the CUF values from the ASME Section III Class 1 fatigue analyses as input in determining intermediate break locations. Locations with a CUF value less than 0.10 did not require an intermediate break to be postulated. Since the HELB analyses are based on the Class 1 piping fatigue TLAAs that provided the CUF values, which analyzed a number of cycles postulated to bound 40 years of service, they have also been identified as TLAAs.

TLAA Evaluation:

The CUF values used in determining HELB break locations were from the Class 1 piping fatigue analyses previously described in Section 4.3.1. As further described in Section 4.3.1, transient cycle projections were performed that demonstrate that the 40-year transient cycle limits for Class 1 piping are not expected to be exceeded in 60 years. This includes 400 Startup and Shutdown cycles that were evaluated in the original Class 1 piping fatigue analyses. The Fatigue Monitoring program is credited with ensuring that the numbers of actual transient cycles do not exceed the numbers of transient cycles analyzed in the Class 1 piping fatigue analyses that provided the CUF values less than 0.1 used in the HELB analyses. Therefore, no additional break locations need be postulated.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The Class 1 piping fatigue analyses used as input to the HELB analyses are managed by the Fatigue Monitoring (B.3.1.1) program through the period of extended operation.

4.3.6 MAIN STEAM RELIEF VALVE DISCHARGE PIPING FATIGUE ANALYSES

TLAA Description:

Eighteen Main Steam Relief Valve (MSRV) discharge lines of a 12-inch nominal pipe size penetrate the drywell and suppression pool diaphragm slab with the purpose of transporting steam and non-condensable gases to the suppression pool from the reactor during MSRV lifts and under accident conditions. MSRV quenchers are located at the bottom end of the MSRV discharge piping and are mounted to the floor of the suppression pool. Holes in the arms of the quenchers provide the dispersion of the steam into the suppression pool.

The Class 3 system was conservatively analyzed for fatigue using Class 1 analysis methodology for the portion of the MSRV discharge lines that extends from the drywell floor penetration to the quencher.

The MSRV discharge lines were analyzed for the appropriate load combinations and the associated number of cycles. The combined stresses and corresponding equivalent stress cycles were computed to obtain the fatigue usage factors in accordance with the equations of Subsection NB-3600 of the ASME Code. The numbers of cycles were predicted to bound 40 years of service. Therefore, this fatigue analysis has been identified as a TLAA that require evaluation for 60 years.

TLAA Evaluation:

A fatigue analysis was performed for the limiting MSRV discharge line located in the suppression chamber wetwell. The MSRV discharge lines are subject to dynamic and hydrodynamic loads from normal, upset, and LOCA-related plant operating conditions. MSRV discharge line selected for evaluation is the low-low setpoint line, which experiences the highest number of MSRV actuations during its service life, hence the highest fatigue usage. The critical point on the line is at the elbow where it is connected to a stanchion support, which has the highest stresses in the analysis due to the large thrust load being applied to the stanchion during MSRV discharges. It is also a location with a discontinuity where the schedule 160 elbow attaches to the schedule 80 piping.

The normal and upset events analyzed are those specified in UFSAR Table 3.9-24 (Reference 4.8.22) and in LRA Tables 4.3.1-1 and 4.3.1-2. The LOCA event analyzed is the Small Break Accident (SBA) event, which was determined to bound the Design Basis Accident (DBA) and Intermediate Break Accident (IBA) LOCA events based on the relatively high number of cycles associated with the SBA as compared to the other events. Since the three types of LOCA are mutually exclusive, only the SBA event was analyzed. The analysis accounts for the hydrodynamic loadings that can affect the MSRV discharge piping, including MSRV actuations, chugging, and seismic effects. 2,800 MSRV actuations were evaluated (Reference 4.8.33). Condensation oscillation loads were determined to be insignificant in this fatigue analysis due to the low steam flow present during an SBA. The CUF value determined for the limiting MSRV discharge line is 0.616.

LRA Tables 4.3.1-1 and 4.3.1-2 provide 60-year projections for the normal, upset, and emergency events that were analyzed, including a LOCA and MSRV actuation cycles, that demonstrate the numbers of cycles analyzed for the MSRV discharge piping will not be exceeded during the period of extended operation. Chugging cycles are caused by LOCA events that are monitored and have 60-year projections that do not exceed the number of cycles analyzed for 40 years.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The MSRV discharge piping analyses have been demonstrated to remain valid through the period of extended operation.

4.4 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC COMPONENTS

4.4.1 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC COMPONENTS

TLAA Description:

Thermal, radiation, and cyclical aging analyses of plant electrical and I&C components, developed to meet 10 CFR 50.49 requirements, have been identified as TLAAs for LSCS. The NRC has established nuclear station environmental qualification (EQ) requirements in 10CFR50.49 and 10 CFR 50, Appendix A, Criterion 4. 10 CFR 50.49 specifically requires that an EQ program be established to demonstrate that certain electrical components located in harsh plant environments are qualified to perform their safety function in those harsh environments after the effects of in-service aging. Harsh environments are defined as those areas of the plant that could be subject to the harsh environmental effects of a loss-of-coolant accident (LOCA), high energy line break (HELB), or post-LOCA radiation. 10 CFR 50.49 requires that the effects of significant aging mechanisms be addressed as part of environmental qualification.

Environmental Qualification Program Background

The LSCS EQ Program meets the requirements of 10 CFR 50.49 for the applicable electrical components important to safety. 10 CFR 50.49 defines the scope of components to be included, requires the preparation and maintenance of a list of in scope components, and requires the preparation and maintenance of a qualification file that includes component performance specifications, electrical characteristics and the environmental conditions to which the components could be subjected.

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. 10 CFR 50.49(f) establishes four methods of demonstrating qualification for aging and accident conditions. 10 CFR 50.49(k) and (l) permit different qualification criteria to apply based on plant and component vintage. Supplemental EQ regulatory guidance for compliance with these different qualification criteria is provided in NUREG-0588, Revision 1, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," July 1981 (Reference 4.8.15), and Regulatory Guide 1.89, Revision 1, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants," June 1984 (Reference 4.8.16).

Compliance with 10CFR50.49 provides reasonable assurance that the component can perform its intended functions during accident conditions after experiencing the effects of in-service aging. The LSCS 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 LSCS 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.

TLAA Evaluation:

The LSCS EQ Program implements the requirements of 10 CFR 50.49, as further defined and clarified by NUREG-0588, Revision 1 and Regulatory Guide 1.89, Revision 1, and is viewed as an aging management program for license renewal under 10 CFR 54.21(c)(1)(iii). Reanalysis of an aging evaluation to extend the qualifications of components is performed on a routine basis as part of the LSCS EQ Program. Important attributes for the reanalysis of an aging evaluation include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met). TLAA demonstration option (iii), which states that the effects of aging will be adequately managed for the period of extended operation, is chosen and the LSCS EQ Program will manage the aging effects of the components associated with the environmental qualification TLAA.

NUREG-1800 states that the staff evaluated the EQ program (10CFR50.49) 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 below.

Component Reanalysis Attributes

The reanalysis of an aging evaluation is normally performed to extend the qualification by reducing 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 LSCS EQ Program. While a component life-limiting condition may be due to thermal, radiation, or cyclical aging, the 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, unrealistically low activation energy, or in the application of a component (de-energized versus energized). The reanalysis of an aging evaluation is documented according to LSCS quality assurance program requirements, which require the verification of assumptions and conclusions. As previously 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 LSCS EQ Program uses the same analytical models in the reanalysis of an aging evaluation as those previously applied during the prior evaluation. The Arrhenius methodology is an acceptable thermal model for performing a thermal aging evaluation. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose, 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.

Data Collection & Reduction Methods

The chief method used for a reanalysis per the LSCS EQ Program is reduction of 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 and based on plant design temperatures or on actual plant temperature data. When used, plant temperature data can be obtained in several ways, including monitors used for technical specification compliance, other installed monitors, measurements made by plant operators during rounds, and temperature sensors on large motors. A representative number of temperature measurements are evaluated to establish the temperatures used in an aging evaluation. Plant temperature data may be used in an aging evaluation in different ways, such as: (a) directly applying the plant temperature data in the evaluation or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation. Any changes to material activation energy values as part of a reanalysis must be justified. Similar methods of reducing conservatism in the component service conditions used in prior aging evaluations can be used for radiation and cyclical aging.

Underlying Assumptions

LSCS EQ Program component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

Acceptance Criteria and Corrective Action

Under the LSCS 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 is 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.

The LSCS 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 LSCS EQ Program provides reasonable assurance that the aging effects will be managed and that EQ components will continue to perform their intended functions for the period of extended operation. A comparison of the LSCS Environmental Qualification (EQ) of Electric Components (B.3.1.3) program to the corresponding program in NUREG-1801 is provided in Appendix B, Subsection B.3.1.3.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be managed by the LSCS EQ Program for the period of extended operation.

4.5 CONCRETE CONTAINMENT TENDON PRESTRESS ANALYSES

4.5.1 CONCRETE CONTAINMENT TENDON PRESTRESS ANALYSES

TLAA Description:

The Primary Containment Structures at LaSalle County Station Units 1 and 2 are steel lined post-tensioned reinforced concrete structures. The Primary Containment structures are BWR (boiling water reactor) Mark II design with multiple downcomers penetrating a reinforced concrete drywell floor and connecting the reactor drywell to the water pool in the suppression chamber. The Primary Containment consists of a steel head and post-tensioned concrete wall standing on a base mat of conventionally-reinforced concrete. The containment wall post-tensioning system extends from the base slab elevation to the refuel floor. The post-tensioning system is made of 188 horizontal and 120 vertical unbonded tendons. The tendons are enclosed in steel conduits filled with a corrosion protection medium. Each tendon consists of 90 high strength steel wires.

Over time, the containment prestressing forces decrease due to relaxation of the steel tendons and due to creep and shrinkage of the concrete. The containment tendon prestressing forces were calculated during the original design considering the magnitude of the tendon relaxation and concrete creep and shrinkage over the 40-year life of the plant. The ASME Section XI, Subsection IWL (B.2.1.30) program includes periodic surveillances of individual tendon prestressing values. Predicted lower limit (PLL) force values are calculated for each tendon prior to the surveillances to estimate the magnitude of the tendon relaxation and concrete creep and shrinkage for the given surveillance year. The individual tendon prestressing force values are measured and plotted, and trend lines are developed, to ensure the tendon type prestressing values remain above the respective minimum required values (MRVs) until the next scheduled surveillance, and for the 40-year period. The predicted lower limit force values and regression analyses, utilizing actual measured individual tendon forces, are used to evaluate the acceptability of the containment structure to perform its intended function over the current 40-year life of the plant, and therefore, are TLAAs requiring evaluation for the period of extended operation.

TLAA Evaluation:

<u>Predicted Lower Limit (PLL)</u>

The containment tendon prestressing force values were calculated during the original design of the containment structure to determine the initial prestressing force required for each tendon type (vertical and horizontal (hoop) tendons), such that the prestressing force would remain above the respective MRVs over the 40-year life of the plant. The initial tendon prestressing force was calculated for each tendon type to compensate for the steel tendon relaxation losses and concrete creep and shrinkage so that the estimated final effective tendon prestressing force at the end of the 40 years would be higher than the minimum required values (MRVs).

As part of the ASME Section XI, Subsection IWL inspections related to tendon examinations, PLL force values are calculated for each individual tendon scheduled for examination, for the given surveillance year. The PLL force values are developed consistent with the guidance presented in Regulatory Guide 1.35 (Reference 4.8.25) and Regulatory Guide 1.35.1 (Reference 4.8.26). Actual measured values for each tendon are compared to their respective PLL values, with acceptance criteria consistent with ASME Section XI, Subsection IWL requirements.

Regression Analysis

A regression analysis is developed for each tendon type to determine the trend over time in prestressing values of individual tendons within each tendon type. The regression analysis consists of a trend line utilizing actual individual tendon prestressing forces measured during successive ASME Section XI, Subsection IWL surveillances, consistent with NRC Information Notice 99-10, Attachment 3 (Reference 4.8.27). The trend lines are periodically updated with new tendon prestressing force data for individual tendons following each surveillance. The trend lines are used to demonstrate that the individual and tendon type prestressing forces will remain above the MRV for the tendon type until the next scheduled surveillance, and potentially for the life of the plant.

Evaluation

The regression analyses associated with the vertical and horizontal tendons at LSCS, Units 1 and 2, have been reanalyzed to extend the trend lines from 40 years to 60 years. The extended trend lines have been calculated using individual tendon prestressing force values based on data incorporating tendon physical test results for LSCS Units 1 and 2. In all cases, the regression analyses predict the prestressing forces will remain above the respective group MRVs through the period of extended operation.

Figures 4.5.1-1 through 4.5.1-4 contain the reanalyzed regression analyses for each tendon type at LSCS, Units 1 and 2. Extended trend lines have been developed for both the group control tendons, as well as for all tendons within the respective group, including the control tendons, and plotted with the MRVs over the 60 year period.

The Concrete Containment Tendon Prestress (B.3.1.2) program will monitor and manage the TLAAs and the associated loss of tendon prestressing forces during the period of extended operation. The regression analyses are periodically updated following successive surveillances to ensure that estimated values remain above the MRVs until the next scheduled surveillance and for the life of the plant. Individual measured tendon prestressing forces will be compared to predicted PLL values and trend lines developed for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The Concrete Containment Tendon Prestress (B.3.1.2) program will manage TLAAs and the associated effects of loss of prestress forces on the containment tendon prestressing system through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

Figure 4.5.1-1 - LSCS Unit 1 Vertical Containment Tendon Lift-off Forces

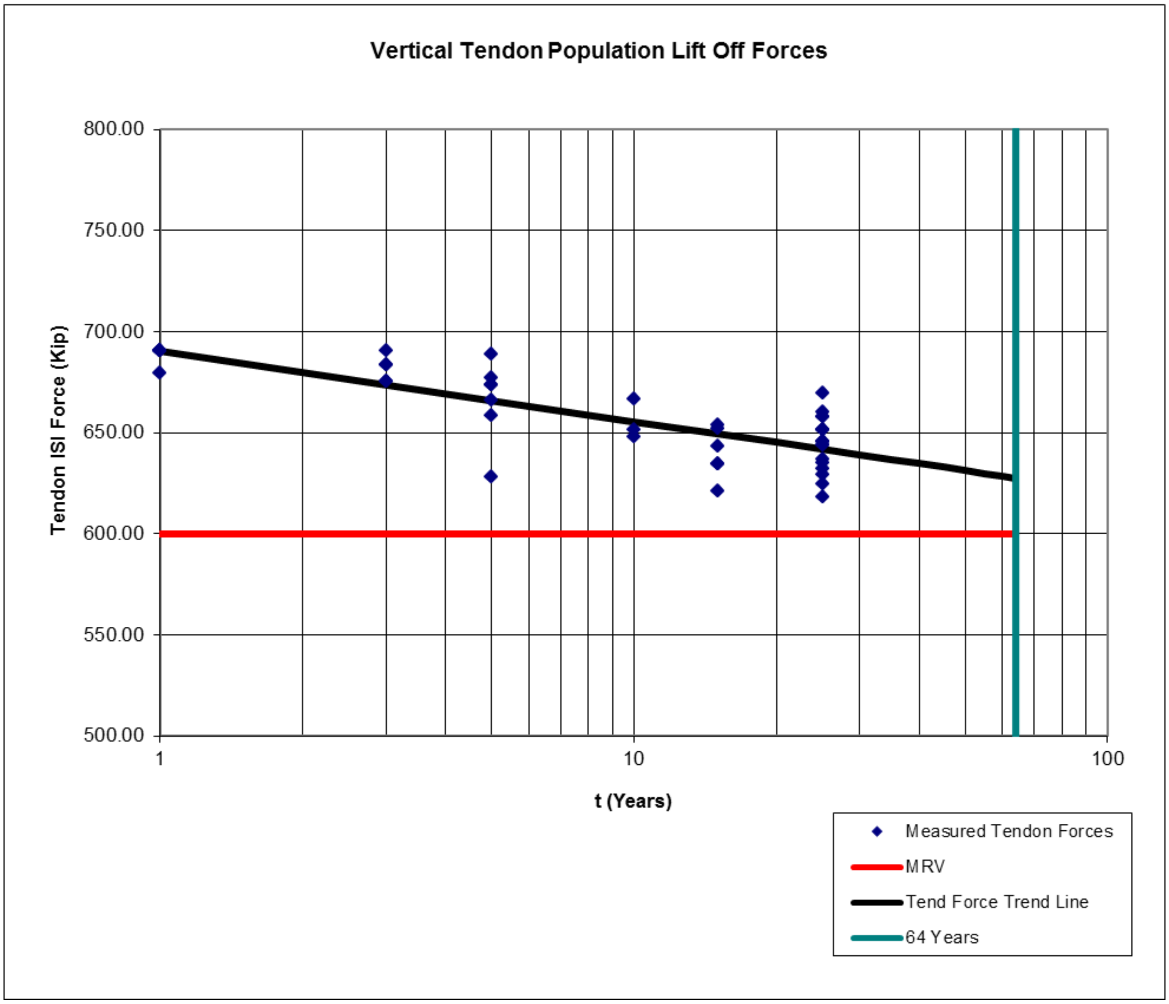


Figure 4.5.1-2 - LSCS Unit 2 Vertical Containment Tendon Lift-off Forces

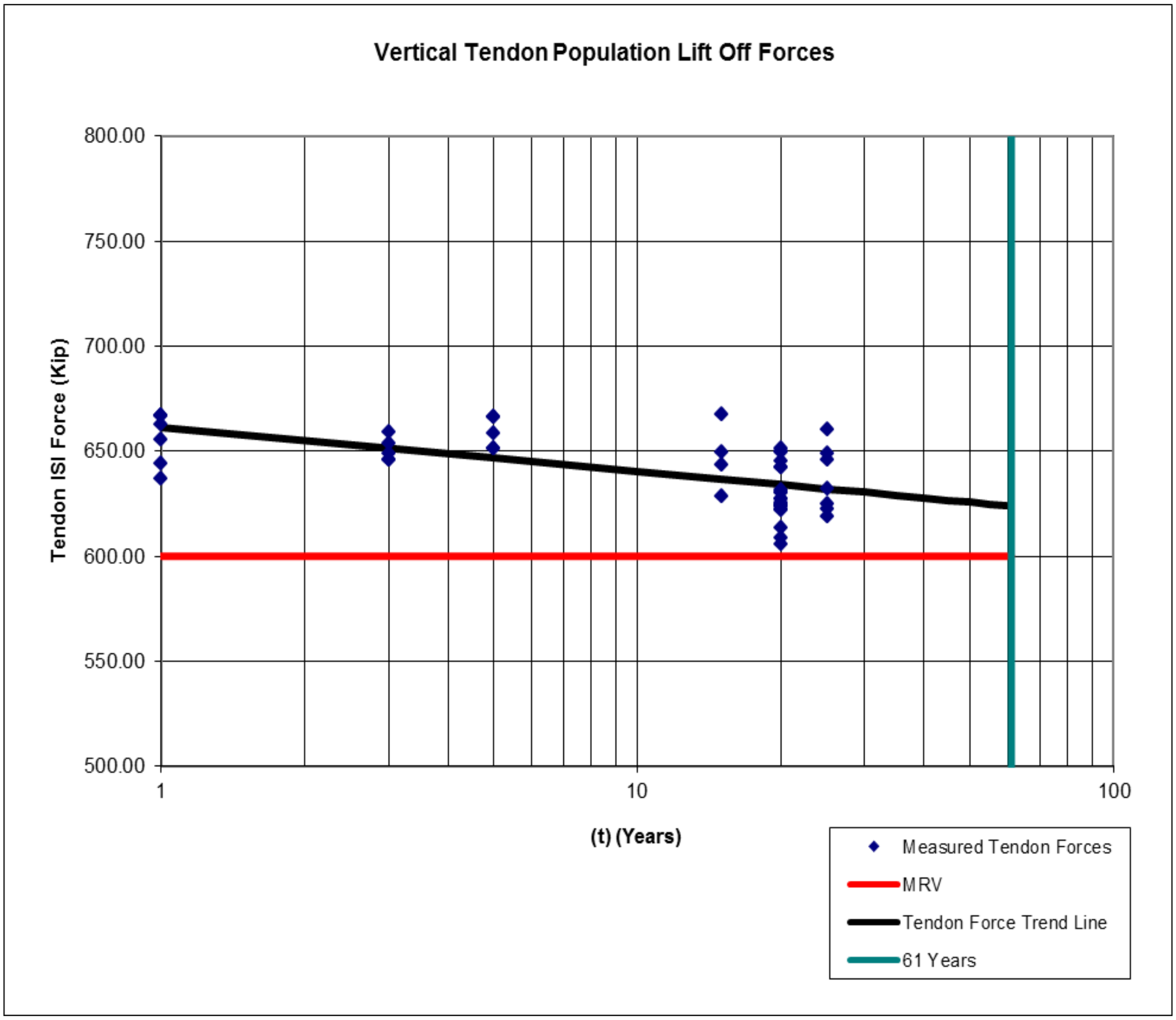


Figure 4.5.1-3 - LSCS Unit 1 Horizontal (Hoop) Tendon Lift-off Forces

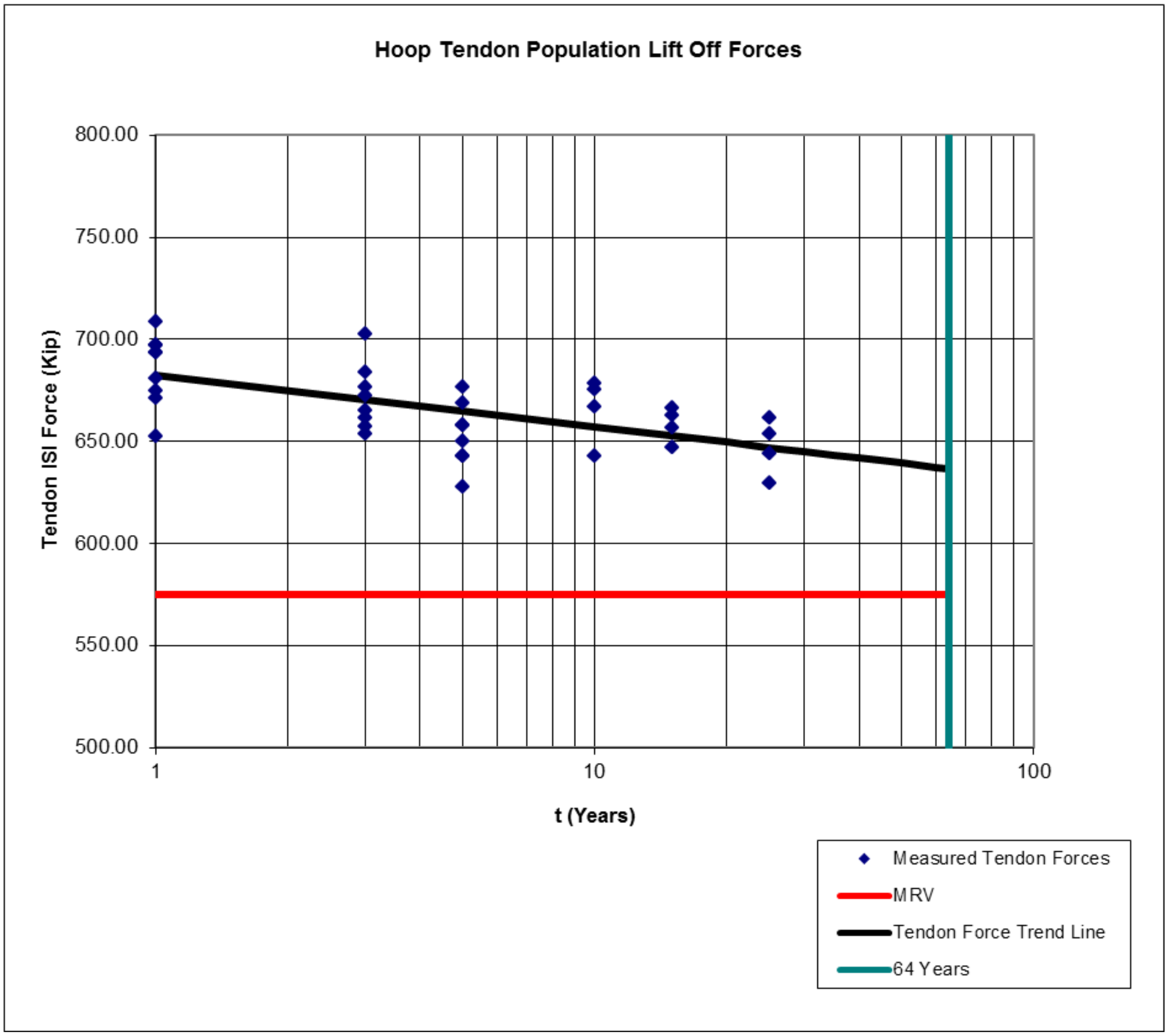
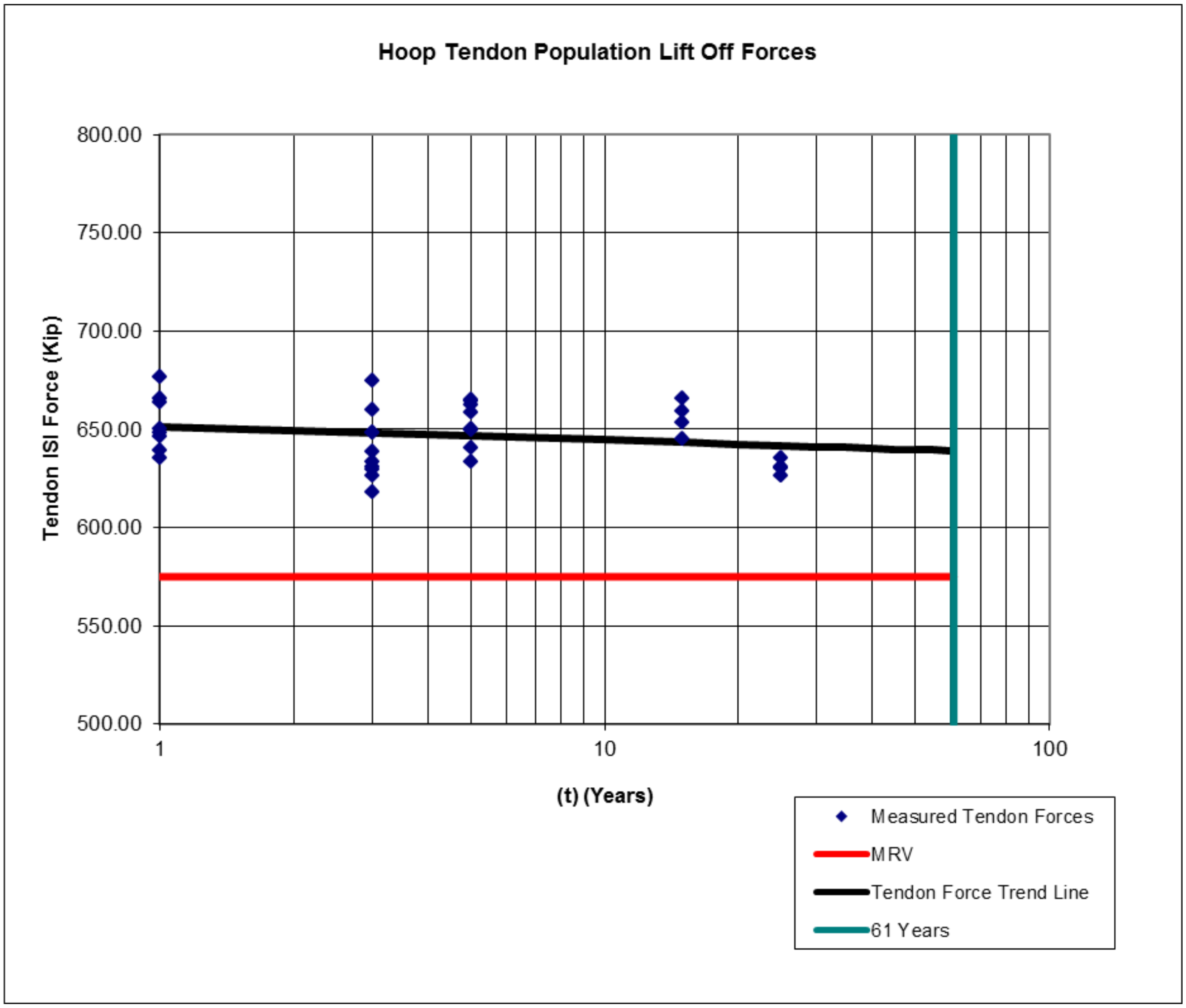


Figure 4.5.1-4 LSCS Unit 2 Horizontal (Hoop) Tendon Lift-off Forces



4.6 PRIMARY CONTAINMENT FATIGUE ANALYSES

This section evaluates:

- Primary Containment Liner and Penetrations Fatigue Analyses
- Primary Containment Refueling Bellows Fatigue Analysis
- Primary Containment Downcomer Vents Fatigue Analyses

4.6.1 PRIMARY CONTAINMENT LINER AND PENETRATIONS FATIGUE ANALYSES

TLAA Description:

The LSCS primary containment liner, Class MC components, and flued-head penetrations were designed and analyzed for transient cycles predicted for 40 years. These analyses have been identified as TLAAs.

Fatigue evaluation of the LSCS primary containment liner (Reference 4.8.24) was performed in accordance with Subsection NE-3222-4 of ASME Code, Section III, based upon the transient cycles listed in UFSAR Table 5.2-4 (Reference 4.8.17), which were predicted for 40 years. The fatigue analysis of the primary containment liner plate has been identified as a TLAA.

Process pipe penetrations fall under three types. For all three types, the penetration sleeve is anchored in the wall and extends just inside the containment wall liner. For Type I penetrations, the flued head, and a section of the process pipe is one forged piece. For Type II, the flued head is forged and is welded to the process pipe by a full penetration weld. The head fitting for Type III penetrations is a flat plate attached to the process pipe by a full penetration weld. The penetration sleeve in its entire length, when it passes through a Class MC containment vessel, is considered a Class MC component and is designed in accordance with Subsection NE of the ASME B&PV Code, Section III (Reference 4.8.30).

The portion of the containment penetration assembly that consists of the head fitting is considered a Code Class 1 component if it is a Type I flued head and is considered a Code Class MC component if it is a Type II or III flued head. ASME Class MC steel components of the concrete containment are those that form a part of the pressure boundary and are not backed by structural concrete. This includes the drywell head assembly, personnel lock, equipment hatches, CRD removal hatch, suppression chamber access hatches, and piping and electrical penetrations (Reference 4.8.28). The Class MC components are designed in accordance with Subsection NE of the ASME B&PV Code, Section III.

The fatigue analyses prepared for the containment liner plate, containment penetrations, and Class MC components have been identified as TLAAs that require evaluation for the period of extended operation.

TLAA Evaluation:

The design analysis procedure for the primary containment complies with the requirements of Article CC-3000 of the ASME B&PV Code, Section III, Division 2. Special emphasis was placed upon the analysis of hydrodynamic loads imposed on major drywell and wetwell structures and components by various combinations of MSRV discharges and postulated LOCA events in the LSCS-Mark II Design Assessment Report (Reference 4.8.24). Stresses in the liner plate and anchorage system (welds and anchors) from mechanical loads and hydrodynamic loads, such as MSRV discharge and chugging were evaluated. Fatigue evaluation of the liner was performed according to ASME Section III, Subsection NE-3222.4. The primary containment penetration sleeves and head fittings were evaluated for normal and upset transients, including the worst combination of maximum operating pressures and temperatures, plus thermal transients, plus loads due to weight, operating basis earthquake (OBE), thermal expansion, relative seismic displacements, hydraulic transients, MSRV discharge, pool swell, and bubble effects, as applicable (Reference 4.8.31). Under these loading combinations, the Type I head fittings and penetration sleeves meet all applicable stress requirements set forth in ASME Section III, Paragraphs NB-3222, and NB-3223. The Type II and III head fittings meet the requirements from Paragraph NE-3222 of ASME Section III.

The penetration sleeves and head fittings were also evaluated for emergency conditions, including the worst combination of maximum operating pressure and temperatures, plus loads due to weight, safe shutdown earthquake (SSE), hydraulic transients, MSRV discharge, pool swell and bubble effects, as applicable (Reference 4.8.32).

Table 4.3.1-2 shows the results of 60-year transient cycle projections for Unit 2, which demonstrate that the transient cycle limits for the Class 1 piping penetrations and containment liner will not be exceeded in 60 years. This includes normal, upset, and emergency events, and design basis accidents. For Unit 1, LRA Table 4.3.1-1 shows that the transient cycle limits for most events will not be exceeded in 60 years, but the numbers of startup and shutdown cycles are projected to slightly exceed their design limits. The Fatigue Monitoring program will be used to monitor and track the analyzed transients and to trigger corrective action prior to exceeding the transient limits to ensure the component cumulative usage factor (CUF) is not permitted to exceed the design limit of 1.0 for these components.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended functions of components analyzed in accordance with ASME Section III, Class 1 requirements will be managed by the Fatigue Monitoring (B.3.1.1) program through the period of extended operation

4.6.2 PRIMARY CONTAINMENT REFUELING BELLOWS FATIGUE ANALYSIS

TLAA Description:

The Unit 1 and Unit 2 reactor cavities each have a metal refueling bellows that provides a flexible seal to prevent water from the reactor cavity refueling pool from leaking into the drywell during refueling operations. The convoluted cylindrical refueling bellows has a 25-foot diameter and it is located between the reactor vessel basin seal skirt (or bellows support) and the containment seal plate. The fixed basin seal skirt is included in the evaluation of the reactor vessel in Section 4.3.1 since its fatigue analysis is included within the reactor pressure vessel stress report for each unit. The flexible refueling bellows was analyzed separately for cycles predicted to bound 40 years of operation. Therefore, the refueling bellows fatigue analysis has been identified as a TLAA that requires evaluation for 60 years.

TLAA Evaluation:

The refueling bellows was analyzed for the following:

200 startup – shutdown cycles,

200 normal operation cycles,

123 refueling (boltup / unbolt) cycles,

1 normal seismic event, and

1 refueling seismic event.

The total CUF for the bellows is 0.158.

The most significant transient for the refueling bellows is the refueling cycle, which corresponds closely with the boltup / unbolt cycle that is monitored by the Fatigue Monitoring (B.3.1.1) program. During these events, the reactor cavity is filled with water that applies a load to the refueling bellows. Later, when the reactor cavity is emptied, the load is relieved, completing the fatigue cycle. Tables 4.3.1-1 and 4.3.1-2 show that Unit 1 has had approximately 18 boltup cycles to-date and Unit 2 has had approximately 16 boltup cycles to-date. Since the refueling outages are scheduled once every two years, each unit is expected to have less than 20 additional boltup / unbolt cycles through the period of extended operation, so the 123 cycles analyzed will remain bounding for 60 years of operation. For the remainder of these analyzed transient cycles, the 60-year transient cycle projections described in Section 4.3.1 determined that the numbers of cycles analyzed will not be exceeded in 60 years. Therefore, the analysis has been demonstrated to remain valid through the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analysis remains valid through the period of extended operation.

4.6.3 PRIMARY CONTAINMENT DOWNCOMER VENTS FATIGUE ANALYSIS

TLAA Description:

Ninety-eight primary containment downcomer vent pipes with a 23.5-inch inside diameter penetrate the drywell floor and extend below the waterline of the suppression pool for the purpose of transporting steam and non-condensable gases to the suppression pool from the reactor and the drywell during loss-of-coolant accident (LOCA) conditions (Reference 4.8.24, Section 1.1 and Table 1.1-1). In September 1979, the NRC identified concern for potential bypass leakage of Mark II MSRV discharge lines and downcomer vents. The concern for possible fatigue failure of these components in the suppression pool air volume arose from Mark I and Mark II test results, which indicated significant cyclic loading due to MSRV discharge and LOCA phenomena. The question of containment overpressurization was raised. A cumulative fatigue usage analysis was prepared to demonstrate acceptable fatigue behavior.

Total fatigue usage was determined as the sum of partial usage factors for the expected loading conditions over the 40-year plant life. Since the fatigue analysis is based upon load cycles assumed for 40 years of operation, this fatigue analysis has been identified as a TLAA that requires evaluation for the period of extended operation.

TLAA Evaluation:

The fatigue analysis is based on Class 1 piping methods in accordance with the 1977 Edition of the ASME Boiler & Pressure Vessel Code, Section III, Subsection NB, and a conservative determination of load cycles and combinations. The three governing locations for fatigue include: 1) drywell floor anchor, 2) upper bracing attachment location, and 3) lower bracing attachment location. These are the only locations of discontinuity on the downcomers. The downcomers were analyzed for the appropriate load combinations and their associated number of cycles. The combined stresses and corresponding equivalent stress cycles were computed to obtain the fatigue usage factors.

Thermal expansion loading is produced by expansion of the bracing members, resulting in bending of the downcomers. The full thermal expansion loading is assumed during the one postulated LOCA, and, conservatively, for each isolation event. Cyclic MSRV actuation during isolation events is assumed to produce at least a local pool temperature increase, which may heat the submerged bracing. Only one significant thermal cycle of the downcomer will occur during the one postulated LOCA. The one resulting cycle of thermal transient loading is negligible for fatigue and is therefore not considered. The one cycle of a possible quenching effect due to suppression pool spray is also negligible. The only significant internal pressure loading is due to the one postulated LOCA event, during which design pressure is assumed. Operating basis earthquake (OBE) loading is assumed to be 2/3 of safe shutdown earthquake (SSE) loading.

The following sub-events in the 40-year plant life were considered:

1) One SBA LOCA (producing chugging loads) with SSE is assumed, coincident with MSRV actuations from the isolation event, including 10 automatic MSRV actuations and 4 manual actuations.

2) 5 isolation events (cyclic MSRV actuation) each with 1 coincident OBE.

3) Remaining MSRV actuations (including 163 isolation events).

There are 169 plant isolation events during which cyclic actuation of the low-low setpoint MSRV occurs. One isolation event is considered with the small break accident (SBA), plus the coincident SSE; and five isolation events are assumed coincident with the five postulated OBE's.

The total number of MSRV actuations evaluated is 2,788, which includes 169 plant isolation events with 15 subsequent actuations per event plus 253 multiple actuation events.

LRA Tables 4.3.1-1 and 4.3.1-2 show that the number of MSRV actuations projected to occur in 60 years for each unit is significantly lower than the analyzed numbers, partially due to the fact that MSRVs are no longer required to be cycled during plant startups as they were during initial plant operations. Chugging cycles are loads that result from various modes of steam condensation at the downcomer vent ends following a LOCA. The Fatigue Monitoring program monitors a faulted condition event – Pipe Rupture and Blowdown, which corresponds with a LOCA and has a design limit of one cycle. The Fatigue Monitoring program records show that no event has occurred in either unit. Therefore, it is concluded that no chugging events have occurred in either unit since they follow LOCA events.

LRA Tables 4.3.1-1 and 4.3.1-2 show that no Operating Basis Earthquake (OBE) event and that no Safe Shutdown Earthquake (SSE) event has occurred to-date. The 60-year projection of one cycle for each of these events does not exceed the design limit of one cycle. Therefore, it is concluded that the design limit will not be exceeded in 60 years.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The downcomer vent fatigue analysis has been demonstrated to remain valid through the period of extended operation.

4.7 OTHER PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES

This section evaluates:

- Reactor Building Crane Cyclic Loading Analysis
- Main Steam Line Flow Restrictors Erosion Analysis

4.7.1 REACTOR BUILDING CRANE CYCLIC LOADING ANALYSIS

TLAA Description:

The LaSalle reactor building crane is common to both units and is within the scope of license renewal. It was designed to meet the fatigue requirements of the ASME NOG-1-2004 and Crane Manufacturer Association of America (CMAA) Specification 70 for a Class A, Standby or Infrequent Service Crane, as discussed in UFSAR Section 9.1.4.2.3, Reactor Building Crane. This evaluation of load cycles over the 40-year plant life is the basis of a safety determination and has been identified as a TLAA that requires evaluation for the period of extended operation.

TLAA Evaluation:

The evaluation of the reactor building crane cyclic load limit TLAA included (1) reviewing the existing 40-year design basis to determine the number of load cycles considered in the design of the crane, (2) developing a 60-year projection for load cycles for the crane, and (3) comparing the 60-year projected number of load cycles to the 40-year design load cycles.

The reactor building crane is designed in accordance with CMAA Specification 70. Referring to Table 2.8-1 of CMAA Specification 70 (2004), the reactor building crane is a Class A crane and can be considered a crane experiencing “irregular occasional use followed by long idle periods.” For this crane, the CMAA design considerations allow for between 20,000 and 100,000 load cycles. Therefore, 20,000 load cycles is a conservative limitation on load cycles for his crane. Load cycles that lift less than 50 percent of the crane design capacity of 125 tons (62.5 tons) result in minimal fatigue of the crane. Therefore, load cycles that lift 50 tons or more are evaluated.

Table 4.7.1-1 provides the 60-year projections for reactor building crane load cycles. The number of load cycles projected for 60 years of operation is 2,672 load cycles.

The 60-year projected number of load cycles is less than 20 percent of the allowable design value of 20,000 load cycles. Therefore, the reactor building crane load cycle fatigue analysis remains valid for 60 years of plant operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analysis remains valid for the period of extended operation.

Table 4.7.1-1

LSCS Unit 1 and LSCS Unit 2 Reactor Building Crane Load Cycles

Heavy Load Description	Frequency	Number of years	Total Cycles
Construction Total:			200
Refueling Outage Cycles:			
Reactor Vessel Head	2 / year	60	120
Drywell Head	2 / year	60	120
Reactor Vessel Steam Separator	2 / year	60	120
Reactor Cavity Shield Plugs (6)	12 / year	60	720
Dryer / Separator Shield Plugs (1)	2 / per year	60	120
Miscellaneous	4 / year	60	240
Completed ISFSI Cask Load Cycles (16 Casks)			96
ISFSI Cask Load Cycles (2015 – 2043)	30 / year	29	870
Completed Low Level Waste Cask Load Cycles (4 Casks)			24
Low Level Waste Cask Load Cycles – 7 Casks (2015 – 2043)			42
60-year Total Load Cycles			2,672
Design Load Cycles			20,000
Percent of Design Load Cycles after 60 years			13.3%

4.7.2 MAIN STEAM LINE FLOW RESTRICTORS EROSION ANALYSIS

TLAA Description:

A main steam line flow restrictor is welded into each of the four main steam lines between the main steam relief valves and the inboard main steam isolation valve. The restrictor assemblies consist of a stainless steel venturi-type nozzle welded into the carbon steel main steam line piping. The restrictors are designed to limit steam flow to less than 200 percent prior to MSIV closure in the event of a main steam line break outside of primary containment to limit reactor coolant loss, maintain core cooling, and limit the release of radiological material to the environment within allowable regulatory limits.

The analysis of main steam line flow restrictor erosion is discussed in UFSAR Section 5.4.4, summarized below. UFSAR Section 5.4.4 indicates that very slow erosion of the venturi occurs with time and such slight enlargement has no safety significance. Since the erosion evaluation was based on 40 years of operation, erosion of the main steam line flow restrictors has been identified as a TLAA that requires evaluation for the period of extended operation.

TLAA Evaluation:

The resistance of stainless steel to erosion has been established by turbine inspections at another BWR plant that revealed no noticeable effects from erosion on the stainless steel nozzle partitions at similar steam velocities. Calculations indicate that even with erosion rates as high as 0.004 inch per year, after 40 years of operation the increase in choked flow rate would be no more than 5 percent.

The main steam line break accident is discussed in UFSAR Section 15.6.4. The assumed integrated mass of coolant leaving the reactor through the main steam line break is 100,000 lb., of which 14,000 lb. is liquid and 86,000 lb. is steam. The original design bases analyses for the radiological consequences of the main steam line break, summarized in UFSAR Table 15.6-8, resulted in 0.0354 rem whole body dose at the exclusion area boundary in the first 2 hours, and 0.000015 rem whole body dose at the low population zone after 30 days; well below the 10 CFR 100 limit of 25.0 rem. Even if the choked flow rate is increased an additional 5 percent to account for the additional 20 years of service, for a total of 10 percent the increase in dose consequences is negligible relative to 10 CFR 100 limits. Therefore, the potential loss of material due to erosion has been projected to the end of the period of extended operation with acceptable results.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) - The analysis has been projected to the end of the period of extended operation.

4.8 DOCKETED REFERENCES

4.8.1 USNRC Regulatory Guide 1.190, *Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence*, March 2001

4.8.2 Letter from William H. Bateman, USNRC, to Bill Eaton, BWRVIP Chairman; Safety Evaluation of Proprietary EPRI Reports, *BWRVIP RAMA Fluence Methodology Manual (BWRVIP-114)*, *RAMA Fluence Methodology Benchmark Manual (BWRVIP-115*), *RAMA Fluence Methodology – Susquehanna Unit 2 Surveillance Capsule Fluence Evaluation for Cycles 1-5 (BWRVIP-117), RAMA Fluence Methodology Procedures Manual (BWRVIP-121),* and *Hope Creek Flux Wire Dosimeter Activation Evaluation for Cycle 1 (TWE-PSE-001-R-001)*(TAC No. MB9765), dated May 13, 2005; pages 1 and 2 and Section 4.2, pages 9-10

4.8.3 BWRVIP-126*, BWR Vessel and Internals Project, RAMA Fluence Methodology Software,* Version 1.0, EPRI, Palo Alto, CA, 2003, 1007823

4.8.4 USNRC Regulatory Guide 1.99, *Radiation Embrittlement of Reactor Vessel Materials*, Revision 2, May 1988

4.8.5 BWRVIP-135, *BWR Vessel and Internals Project, Integrated Surveillance Program (ISP) Data Source Book and Plant Evaluations*, Revision 2

4.8.6 Not Used

4.8.7 USNRC Generic Letter 98-05*, Boiling Water Reactor Licensees Use of the BWRVIP-05 Report to Request Relief From Augmented Examination Requirements on Reactor Pressure Vessel Circumferential Shell Welds,* November 10, 1998

4.8.8 BWRVIP-05, *BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05),* September 1995

4.8.9 BWRVIP-05 SER (Final), USNRC letter from Gus C. Lainas to Carl Terry, Niagara Mohawk Power Company, BWRVIP Chairman, *Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report, (TAC No. M93925),* July 28, 1998

4.8.10 NEDO-10029, *An Analytical Study on Brittle Fracture of GE-BWR Vessel Subject to the Design Basis Accident*, 1969

4.8.11 Ranganath, S., *"Fracture Mechanics Evaluation of a Boiling Water Reactor Vessel Following a Postulated Loss of Coolant Accident", Fifth International Conference on Structural Mechanics in Reactor Technology, Berlin, Germany*, August 1979, Paper Gi/5

4.8.12 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, *Rules for In-Service Inspection of Nuclear Power Plant Components,* Appendix G*, Fracture Toughness Criteria for Protection Against Failure,* 1998 Edition including 2000 Addenda

4.8.13 NUREG/CR-6260*, Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components,* March 1995

4.8.14 NUREG/CR-6909*, Effect of LWR Coolant Environments on Fatigue Life of Reactor Materials, Final Report,* February 2007

4.8.15 NUREG-0588, *Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment*, Revision 1, July 1981

4.8.16 USNRC Regulatory Guide 1.89, *Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants*, Revision 1, June 1984

4.8.17 UFSAR Table 5.4-2, *Plant Events*

4.8.18 Letter from Matthew A. Mitchell (U. S. NRC) to Rick Libra (BWRVIP), *Safety Evaluation of Proprietary EPRI Report BWR Vessel and Internals Project, Evaluation of Susquehanna Unit 2 Top Guide and Core Shroud Material Samples Using RAMA Fluence Methodology (BWRVIP-145),* dated February 7, 2008 (ML 100260948) (page 1 of letter)

4.8.19 Safety Evaluation by the Office of Nuclear Reactor Regulation BWRVIP-145, BWR Vessel and Internals Project, *Evaluation of Susquehanna Unit 2 Top Guide and Core Shroud Material Samples Using RAMA Fluence Methodology,* Section 2

4.8.20 Safety Evaluation by the Office of Nuclear Reactor Regulation BWRVIP-145, BWR Vessel and Internals Project, *Evaluation of Susquehanna Unit 2 Top Guide and Core Shroud Material Samples Using RAMA Fluence Methodology;* Section 4.1 (pp 4, 6)

4.8.21 EPRI, *"BWR Vessel and Internals Application (BWRVIA) for Radiolysis and ECP Analysis", Version 3.0 (1015470),* Palo Alto, CA, December 10, 2008

4.8.22 UFSAR Table 3.9-24, *Applicable Thermal Transients*

4.8.23 UFSAR Section 3.9.1.1.2*, Hydrodynamic Transients*

4.8.24 LSCS-Mark II DAR, *LaSalle County Station Mark II Dynamic Assessment Report,* June 1981

4.8.25 Regulatory Guide 1.35, Revision 3, *Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments, July 1990*

4.8.26 Regulatory Guide 1.35.1, Revision 3, *Determining Prestressing Forces for Inservice Inspection of Prestressed Concrete Containments,* July 1990

4.8.27 NRC Information Notice 99-10, Attachment 3, *Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments*, April 1999

4.8.28 UFSAR Section 3.8.2, *Steel Containment and Class MC Component*

4.8.29 UFSAR Section 3.8.2.1.6.1, *Penetration Types*

4.8.30 UFSAR Section 3.8.2.1.6.2, *Component Classification*

4.8.31 UFSAR Section 3.8.2.5.2.2.2, *Normal and Upset Conditions*

4.8.32 UFSAR Section 3.8.2.5.2.2.3, *Emergency Conditions*

4.8.33 UFSAR Section 3.7.3.17, *Determination of Number of Safety/Relief Valve (SRV) Discharge Cycles*

4.8.34 USNRC *Safety Evaluation Report for Relief Request CR-38*, January 28, 2004.

4.8.35 10 CFR 50 Appendix A , *General Design Criterion 31, Fracture prevention of reactor coolant pressure boundary*

4.8.36 ASME Boiler and Pressure Vessel Code, Section XI, 2001 Edition through 2004 Addenda.

4.8.37 ASME Boiler and Pressure Vessel Code, Section XI, *Non-mandatory Appendix A*

4.8.38 BWR Vessel and Internals Project, *BWR Core Plate Inspection and Evaluation Guideline (BWRVIP-25),* EPRI Report TR-107284, December 1996.

4.8.39 *Safety Evaluation for Referencing of BWR Vessel and Internals Project, BWR Core Plate Inspection and Evaluation Guideline (BWRVIP-25), Report for Compliance with the Technical Information Requirements of the License Renewal Rule,* December 7, 2000.

4.8.40 NEDC-30271, Revision 9, *LaSalle County Station Unit 1 NSSS New Loads Design Adequacy Evaluation Final Summary Report,* Table 2-3, June 1981.

4.8.41 NEDC-30272, Revision 9, *LaSalle County Station Unit 2 NSSS New Loads Design Adequacy Evaluation Final Summary Report,* Table 2-3, September 1983.

4.8.42 UFSAR Section 9.1.4.2.3, *Reactor Building Crane*

4.8.43 UFSAR Section 5.4.4, *Main Steam Line Flow Restrictors*

4.8.44 UFSAR Section 15.6.4, *Steam System Pipe Break Outside Containment*

4.8.45 UFSAR Table 15.6-8, *Steam Line Break Radiological Effects*

APPENDIX A UPDATED FINAL SAFETY ANALYSIS REPORT SUPPLEMENT TABLE OF CONTENTS

A.1.0 Introduction

The application for a renewed operating license is required by 10 CFR 54.21(d) to include a FSAR Supplement. This appendix, which includes the following sections, comprises the FSAR supplement:

- Section A.1.1 contains a listing of the aging management programs that correspond to NUREG-1801 Chapter XI programs, including the status of the programs at the time the License Renewal Application was submitted.
- Section A.1.2 contains a listing of the plant-specific aging management programs, including the status of the programs at the time the License Renewal Application was submitted.
- 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, including the status of the programs at the time the License Renewal Application was submitted.
- Section A.1.4 contains a listing of the Time-Limited Aging Analyses summaries (TLAAs).
- Section A.1.5 contains a discussion of the Quality Assurance Program and Administrative Controls.
- Section A.1.6 contains a discussion of the Operating Experience.
- Section A.2 contains a summarized description of the aging management programs.
- 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.3 contains a summarized description of the NUREG-1801 Chapter X programs that support the TLAAs.
- Section A.4 contains a summarized description of the TLAAs applicable to the period of extended operation.
- Section A.5 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 systems, structures, and components within the scope of license renewal will continue to perform their intended functions consistent with the current licensing basis (CLB) for the period of extended operation. The period of extended operation is defined as 20 years from the unit's current operating license expiration date.

A.1.1 NUREG-1801 Chapter XI Aging Management Programs

The NUREG-1801 Chapter XI Aging Management Programs (AMPs) are described in the following sections. The AMPs are either consistent with generally accepted industry methods as discussed in NUREG-1801 or require enhancements.

The following list reflects the status of these programs at the time of the License Renewal Application (LRA) submittal. Commitments for program additions and enhancements are identified in the Appendix A.5 License Renewal Commitment List.

1. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (Section A.2.1.1) [Existing]
2. Water Chemistry (Section A.2.1.2) [Existing]
3. Reactor Head Closure Stud Bolting (Section A.2.1.3) [Existing]
4. BWR Vessel ID Attachment Welds (Section A.2.1.4) [Existing]
5. BWR Feedwater Nozzle (Section A.2.1.5) [Existing]
6. BWR Control Rod Drive Return Line Nozzle (Section A.2.1.6) [Existing]
7. BWR Stress Corrosion Cracking (Section A.2.1.7) [Existing]
8. BWR Penetrations (Section A.2.1.8) [Existing]
9. BWR Vessel Internals (Section A.2.1.9) [Existing - Requires Enhancement]
10. Flow-Accelerated Corrosion (Section A.2.1.10) [Existing]
11. Bolting Integrity (Section A.2.1.11) [Existing - Requires Enhancement]
12. Open-Cycle Cooling Water System (Section A.2.1.12) [Existing - Requires Enhancement]
13. Closed Treated Water Systems (Section A.2.1.13) [Existing - Requires Enhancement]
14. Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (Section A.2.1.14) [Existing - Requires Enhancement]
15. Compressed Air Monitoring (Section A.2.1.15) [Existing - Requires Enhancement]

16. Fire Protection (Section A.2.1.16) [Existing - Requires Enhancement]
17. Fire Water System (Section A.2.1.17) [Existing - Requires Enhancement]
18. Aboveground Metallic Tanks (Section A.2.1.18) [Existing - Requires Enhancement]
19. Fuel Oil Chemistry (Section A.2.1.19) [Existing - Requires Enhancement]
20. Reactor Vessel Surveillance (Section A.2.1.20) [Existing]
21. One-Time Inspection (Section A.2.1.21) [New]
22. Selective Leaching (Section A.2.1.22) [New]
23. One-time Inspection of ASME Code Class 1 Small-Bore Piping (Section A.2.1.23) [New]
24. External Surfaces Monitoring of Mechanical Components (Section A.2.1.24) [New]
25. Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (Section A.2.1.25) [New]
26. Lubricating Oil Analysis (Section A.2.1.26) [Existing]
27. Monitoring of Neutron-Absorbing Materials Other Than Boraflex (Section A.2.1.27) [Existing - Requires Enhancement]
28. Buried and Underground Piping (Section A.2.1.28) [Existing - Requires Enhancement]
29. ASME Section XI, Subsection IWE (Section A.2.1.29) [Existing - Requires Enhancement]
30. ASME Section XI, Subsection IWL (Section A.2.1.30) [Existing - Requires Enhancement]
31. ASME Section XI, Subsection IWF (Section A.2.1.31) [Existing - Requires Enhancement]
32. 10 CFR Part 50, Appendix J (Section A.2.1.32) [Existing]
33. Masonry Walls (Section A.2.1.33) [Existing - Requires Enhancement]
34. Structures Monitoring (Section A.2.1.34) [Existing - Requires Enhancement]

35. RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (Section A.2.1.35) [Existing - Requires Enhancement]

36. Protective Coating Monitoring and Maintenance Program (Section A.2.1.36) [Existing]

37. Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section A.2.1.37) [New]

38. Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (Section A.2.1.38) [New]

39. Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section A.2.1.39) [New]

40. Metal Enclosed Bus (Section A.2.1.40) [Existing - Requires Enhancement]

41. Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section A.2.1.41) [New]

A.1.2 Plant-Specific Aging Management Programs

The plant-specific aging management programs are described in the following sections. The following list reflects the status of these programs at the time of the License Renewal Application (LRA) submittal. Commitments for program additions and enhancements are identified in Appendix A.5 License Renewal Commitment List.

1. Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (Section A.2.2.1) [New]

A.1.3 NUREG-1801 Chapter X Aging Management Programs

The NUREG-1801 Chapter X Aging Management Programs (AMP) associated with Time-Limited Aging Analyses are described in the following sections. The AMPs are either consistent with generally accepted industry methods as discussed in NUREG-1801 Chapter X or require enhancements. The following list reflects the status of these programs at the time of the License Renewal Application (LRA) submittal. Commitments for program additions and enhancements are identified in Appendix A.5 License Renewal Commitment List.

1. Fatigue Monitoring (Section A.3.1.1) [Existing - Requires Enhancement]

2. Concrete Containment Tendon Prestress (Section A.3.1.2) [Existing - Requires Enhancement]

3. Environmental Qualification (EQ) of Electric Components (Section A.3.1.3) [Existing]

A.1.4 Time-Limited Aging Analyses

Summaries of the Time-Limited Aging Analyses applicable to the period of extended operation are included in the following sections:

1. Reactor Vessel and Internals Neutron Embrittlement Analyses (Section A.4.2)
2. Neutron Fluence Analyses (Section A.4.2.1)
3. Upper-Shelf Energy Analyses (Section A.4.2.2)
4. Adjusted Reference Temperature Analyses (Section A.4.2.3)
5. Pressure – Temperature Limits (Section A.4.2.4)
6. Axial Weld Failure Probability Assessment Analyses (Section A.4.2.5)
7. Circumferential Weld Failure Probability Assessment Analyses (Section A.4.2.6)
8. Reactor Pressure Vessel Reflood Thermal Shock Analyses (Section A.4.2.7)
9. RPV Core Plate Rim Hold-Down Bolt Loss of Preload Analysis (Section A.4.2.8)
10. Jet Pump Riser Brace Clamp Loss of Preload Analysis (Section A.4.2.9)
11. Jet Pump Slip Joint Repair Clamp Loss of Preload Analysis (Section A.4.2.10)
12. Metal Fatigue Analyses (Section A.4.3)
13. ASME Section III, Class 1 Fatigue Analyses (Section A.4.3.1)
14. ASME Section III, Class 2 and 3 and ANSI B31.1 Allowable Stress Analyses (Section A.4.3.2)
15. Environmental Fatigue Analyses for RPV and Class 1 Piping (Section A.4.3.3)
16. Reactor Vessel Internals Fatigue Analyses (Section A.4.3.4)
17. High-Energy Line Break (HELB) Analyses Based Upon Fatigue (Section A.4.3.5)
18. Main Steam Relief Valve Discharge Piping Fatigue Analyses (Section A.4.3.6)

19. Environmental Qualification (EQ) of Electric Components (Section A.4.4)
20. Environmental Qualification (EQ) of Electric Components (Section A.4.4.1)
21. Concrete Containment Tendon Prestress Analyses (Section A.4.5)
22. Concrete Containment Tendon Prestress Analyses (Section A.4.5.1)
23. Primary Containment Fatigue Analyses (Section A.4.6)
24. Primary Containment Liner and Penetrations Fatigue Analyses (Section A.4.6.1)
25. Primary Containment Refueling Bellows Fatigue Analysis (Section A.4.6.2)
26. Primary Containment Downcomer Vents Fatigue Analysis (Section A.4.6.3)
27. Other Plant-Specific Analyses (Section A.4.7)
28. Reactor Building Crane Cyclic Loading Analysis (Section A.4.7.1)
29 Main Steam Line Flow Restrictors Erosion Analysis (Section A.4.7.2)

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. The Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls, and is applicable to the safety-related and nonsafety-related systems, structures, and components (SSCs) that are subject to Aging Management Review (AMR). In many cases, existing activities were found adequate for managing aging effects during the period of extended operation.

A.1.6 Operating Experience

Operating experience from plant-specific and industry sources is captured and systematically reviewed on an ongoing basis in accordance with the quality assurance program, which meets the requirements of 10 CFR Part 50, Appendix B, and the operating experience program, which meets the requirements of NUREG-0737, “Clarification of TMI Action Plan Requirements,” Item I.C.5, “Procedures for Feedback of Operating Experience to Plant Staff.” The operating experience program interfaces with and relies on active participation in the Institute of Nuclear Power Operations’ operating experience program, as endorsed by the NRC. The Exelon fleet OPEX program that is implemented at LSCS conforms to the recommendations of LR-ISG-2011-05, “Ongoing Review of Operating Experience.” In accordance with this program, all incoming operating experience items are screened to determine whether they may involve age-related degradation or aging management impacts. Items so identified are further evaluated and the AMPs are either enhanced or new AMPs are developed, as appropriate, when it is determined through these evaluations that the effects of aging may not be adequately managed. Training on age-related degradation and aging management is provided, commensurate with their role in the process, to those personnel responsible for implementing the AMPs and who may submit, screen, assign, evaluate, or otherwise process plant-specific and industry operating experience. Plant-specific operating experience associated with aging management and age-related degradation is reported to the industry in accordance with guidelines established in the operating experience program.

A.2.0 Aging Management Programs

A.2.1 NUREG-1801 Chapter XI Aging Management Programs

This section provides summaries of the NUREG-1801 Chapter XI programs credited for managing the effects of aging.

A.2.1.1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program is an existing condition monitoring program that consists of periodic volumetric, surface, and visual examinations of ASME Class 1, 2, and 3 components including welds, pump casings, valve bodies, integral attachments, and pressure-retaining bolting for assessment, identification of signs of degradation, and establishment of corrective actions. The examinations are implemented in accordance with 10 CFR 50.55a and ASME Code, Section XI Subsections IWB, IWC, and IWD. These activities include examinations, evaluations, and monitoring and trending of results to confirm that effects of cracking and loss of fracture toughness are managed effectively during the period of extended operation.

A.2.1.2 Water Chemistry

The Water Chemistry aging management program is an existing mitigative program whose activities consist of monitoring and control of water chemistry to manage the aging of components exposed to treated water. Major component types managed by the program include the reactor vessel, reactor internals, piping, piping elements and piping components, heat exchangers, and tanks. The Water Chemistry program keeps peak levels of various contaminants below system-specific limits based on the industry recognized guidelines of the Boiling Water Reactor Vessel and Internals Project (BWRVIP 190, Revision 1, Electric Power Research Institute - 3002002623) for the mitigation of loss of material, reduction of heat transfer and cracking aging effects. In addition, the Water Chemistry program is also credited for mitigating loss of material and cracking for components exposed to sodium pentaborate, steam and reactor coolant environments. Chemistry programs are used to control water chemistry for impurities that accelerate corrosion to mitigate aging effects on component surfaces.

A.2.1.3 Reactor Head Closure Stud Bolting

The Reactor Head Closure Stud Bolting aging management program is an existing condition monitoring and preventive program that manages reactor head closure studs and associated nuts, washers, bushings, and flange threads for cracking and loss of material. The program is implemented through station procedures based on the examination requirements specified in ASME Code, Section XI, Subsection IWB, Table IWB-2500-1 and preventive measures to mitigate cracking as delineated in NRC Regulatory Guide 1.65 and NUREG-1339, with the exception that stud bolting components having a measured yield strength greater than 150 ksi are used.

A.2.1.4 BWR Vessel ID Attachment Welds

The BWR Vessel ID Attachment Welds aging management program is an existing condition monitoring program that includes the inspection and evaluation recommendations within BWRVIP-48-A and the requirements of ASME Code, Section XI, Subsection IWB. The program is implemented through station procedures that provide for mitigation of cracking of reactor vessel internal components through management of reactor water chemistry and monitoring for cracking through in-vessel examinations of the reactor vessel internal attachment welds.

A.2.1.5 BWR Feedwater Nozzle

The BWR Feedwater Nozzle aging management program is an existing condition monitoring program that manages the effects of cracking in the feedwater nozzles by augmented inservice inspection (ISI) in accordance with the requirements of the ASME Code, Section XI, Subsection IWB, Table IWB-2500-1 and the recommendations provided within BWROG Licensing Topical Report, GE-NE-523-A71-0594-A. The program includes periodic ultrasonic inspection of critical regions of the reactor vessel feedwater nozzles.

A.2.1.6 BWR Control Rod Drive Return Line Nozzle

The BWR Control Rod Drive Return Line (CRDRL) Nozzle aging management program is an existing condition monitoring program that manages the effects of cracking in the CRDRL reactor pressure vessel nozzle. The CRDRL nozzle has been capped to mitigate thermal fatigue cracking on both units, and the CRD return flow was not rerouted to the reactor vessel. Therefore, augmented inspections in accordance with NUREG-0619 and Generic Letter 80-095 are not required. The program includes inservice inspection (ISI) examinations in accordance with ASME Code, Section XI, Subsection IWB, Table IWB-2500-1. Volumetric ultrasonic inspection is performed on the CRDRL nozzle including the nozzle-to-vessel weld, nozzle blend radius, and nozzle-to-cap welds. The CRDRL nozzle-to-cap weld examinations are performed at a frequency specified by the BWR Stress Corrosion Cracking (A.2.1.7) program that implements commitments from NRC Generic Letter 88-01 and BWRVIP-75-A. The nozzle, cap, and associated welds are included in the visual inspection (VT-2) during the reactor pressure test performed each refueling outage.

A.2.1.7 BWR Stress Corrosion Cracking

The BWR Stress Corrosion Cracking aging management program is an existing condition monitoring and mitigative program that manages intergranular stress corrosion cracking (IGSCC) in relevant piping and piping welds made of stainless steel and nickel based alloy by augmented inservice inspections, regardless of code classification, as delineated in NUREG-0313, Revision 2, and NRC Generic Letter 88-01 and its Supplement 1. The program includes preventive measures to mitigate IGSCC, and inspection and flaw evaluation to monitor IGSCC and its effects. The schedule and extent of the inspections are performed in accordance with the NRC staff-approved BWRVIP-75-A report.

A.2.1.8 BWR Penetrations

The BWR Penetrations aging management program is an existing condition monitoring program that manages the effects of cracking of reactor vessel instrumentation penetrations, CRD housing and incore-monitoring housing penetrations, and the SLC/Core Plate dP penetration exposed to reactor coolant through-water chemistry controls and inservice inspections. In addition to the requirements of ASME Code, Section XI, Subsection IWB, the BWR Penetrations program incorporates the inspection and evaluation recommendations of BWRVIP-49-A, "Instrument Penetration Inspection and Flaw Evaluation Guidelines," BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," BWRVIP-27-A, “BWR Standby Liquid Control System/Core Plate dP Inspection and Flaw Evaluation Guidelines,” and the water chemistry recommendations described in the Water Chemistry (A.2.1.2) program.

A.2.1.9 BWR Vessel Internals

The BWR Vessel Internals aging management program is an existing condition monitoring and mitigative program that manages the effects of cracking, loss of material, and loss of fracture toughness of reactor pressure vessel internal components through condition monitoring activities that consist of examinations that are implemented through station procedures consistent with the recommendations of the BWRVIP guidelines and ASME Code, Section XI, Table IWB-2500-1. The program also addresses aging degradation of X-750 alloy that is used for BWR vessel internal components. The program also mitigates these aging effects by managing water chemistry per the Water Chemistry (A.2.1.2) program.

The program will include aging management of reactor internal components fabricated from Cast Austenitic Stainless Steel (CASS) for loss of fracture toughness due to thermal aging and neutron embrittlement.

The BWR Vessel Internals aging management program will be enhanced to:

1. Perform an assessment of the susceptibility of reactor vessel internal components fabricated from CASS to loss of fracture toughness due to thermal aging embrittlement. If material properties cannot be determined to perform the screening, they will be assumed susceptible to thermal aging for the purposes of determining program examination requirements.

2. Perform an assessment of the susceptibility of reactor vessel internal components fabricated from CASS to loss of fracture toughness due to neutron irradiation embrittlement.

3. Specify the required periodic inspection of CASS components determined to be susceptible to loss of fracture toughness due to thermal aging and neutron irradiation embrittlement. The initial inspections will be performed either prior to or within five years after entering the period of extended operation.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.10 Flow-Accelerated Corrosion

The Flow-Accelerated Corrosion (FAC) aging management program is an existing condition monitoring program based on EPRI guidelines in NSAC-202L-R3, "Recommendations for an Effective Flow Accelerated Corrosion Program." The program provides guidance for prediction, detection, and monitoring of wall thinning in piping and components. Analytical evaluations and periodic examinations of locations that are most susceptible to wall thinning due to FAC are used to predict the amount of wall thinning. Program activities include analyses to determine critical locations, baseline inspections to determine the extent of thinning at these critical locations, and followup inspections to confirm the predictions. Repairs and replacements are performed as necessary.

The Flow-Accelerated Corrosion program also manages wall thinning caused by mechanisms other than FAC, such as cavitation, flashing, droplet impingement, and solid particle impingement, in situations where periodic monitoring is used in lieu of eliminating the cause of various erosion mechanisms.

A.2.1.11 Bolting Integrity

The Bolting Integrity aging management program is an existing condition monitoring program. The program manages loss of preload, cracking, and loss of material due to corrosion of closure bolting on pressure-retaining joints within the scope of license renewal. The Bolting Integrity program incorporates NRC and industry 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 & Applications Guide.”

The program credits visual inspection of pressure-retaining bolted joints in ASME Class 1, 2, and 3 systems for leakage and age-related degradation during system pressure tests performed in accordance with ASME Section XI, Subsections IWB, IWC, and IWD. In addition, the Bolting Integrity program credits volumetric, surface, and visual inspections of ASME Class 1, 2, and 3 bolts, nuts, washers, and associated bolting components performed in accordance with ASME Section XI. The integrity of pressure-retaining bolted joints in non-ASME Class 1, 2, 3 and MC systems is monitored by detection of visible leakage, evidence of past leakage, or other age-related degradation during maintenance activities and walkdowns in plant areas that contain systems within scope of license renewal. Inspection activities of closure bolting on pressure-retaining joints within the scope of license renewal in submerged environments will be performed in conjunction with associated component maintenance activities.

The Bolting Integrity program is supplemented by ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (A.2.1.1) program for inspection of safety-related closure bolting on pressure-retaining joints. Inspection activities for closure bolting on pressure-retaining joints in buried and underground environments are performed by the Buried and Underground Piping (A.2.1.28) program when closure bolting on pressure-retaining joints are exposed by excavation.

The Primary Containment (MC) pressure bolting is managed as part of ASME Section XI, Subsection IWE (A.2.1.29) program. The ASME Section XI, Subsection IWF (A.2.1.31) program manages ASME Class 1, 2, 3 and MC piping and component supports bolting. Structural bolting, other than ASME Class 1, 2, 3, and MC piping and component supports is managed as part of the Structures Monitoring (A.2.1.34) program and R.G. 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (A.2.1.35) program. Crane and hoist bolting is managed by the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (A.2.1.14) program. The heating and ventilation system bolting is managed by the External Surfaces Monitoring of Mechanical Components (A.2.1.24) program. Reactor head closure bolting is managed by the Reactor Head Closure Stud Bolting (A.2.1.3) program. The above bolting is not included in the Bolting Integrity program.

The Bolting Integrity aging management program will be enhanced to:

1. Provide guidance to ensure proper specification of bolting material, lubricant and sealants, storage, and installation torque or tension to prevent or mitigate degradation and failure of closure bolting for pressure-retaining bolted joints.

2. Prohibit the use of lubricants containing molybdenum disulfide on pressure-retaining bolted joints.

3. Minimize the use of high strength bolting (actual measured yield strength equal to or greater than 150 ksi) for pressure-retaining bolted joints in portions of systems within the scope of the Bolting Integrity program. High strength bolting (regardless of code classification) will be monitored for cracking in accordance with ASME Section XI, Table IWB-2500-1, Examination Category B-G-1.

4. Perform visual inspection of submerged bolting for the emergency core cooling systems (ECCS) and reactor core isolation cooling (RCIC) system suction strainers in the suppression pool for loss of material and loss of preload during each ISI inspection interval.

5. Perform visual inspection of submerged bolting for the service water diver safety barriers and diesel fire pump suction screens for loss of material and loss of preload during maintenance activities.

6. Perform visual inspection of submerged bolting for the Lake Screen House traveling screens framework for loss of material and loss of preload each refuel interval.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.12 Open-Cycle Cooling Water System

The Open-Cycle Cooling Water system (OCCWS) aging management program is an existing preventive, mitigative, condition monitoring, and performance monitoring program based on the implementation of NRC GL 89-13, which includes (a) surveillance and control of bio-fouling; (b) tests to verify heat transfer; (c) routine inspection and maintenance program; (d) system walkdown inspection; and (e) review of maintenance, operating, and training practices and procedures. The OCCWS program applies to components constructed of various materials, including steel, stainless steel, cast iron, aluminum alloys, and copper alloys.

The OCCWS program manages heat exchangers, piping, piping elements, and piping components in safety-related and nonsafety-related raw water systems that are exposed to a raw water environment for loss of material and reduction of heat transfer. The guidelines of NRC Generic Letter 89-13 are implemented through LSCS GL 89-13 activities for heat exchangers and the LSCS raw water corrosion program for piping segments. System and component testing, visual inspections, non-destructive examination, and chemical injection are conducted to ensure that identified aging effects are managed such that system and component intended functions and integrity are maintained.

The OCCWS program includes those plant systems that transfer heat from safety-related systems, structures, and components to the ultimate heat sink as defined in GL 89-13. Periodic heat transfer testing, visual inspection, and cleaning of safety-related heat exchangers with a heat transfer intended function is performed in accordance with LSCS commitments to GL 89-13 to verify heat transfer capabilities. Additionally, safety-related piping segments are non-destructively examined to ensure that there is no loss of material which results in loss of intended function.

The Open-Cycle Cooling Water System aging management program will be enhanced to:

1. Perform a minimum of 10 microbiologically influenced corrosion (MIC) degradation inspections for aboveground piping in the Essential Cooling Water System every 24 months until the rate of MIC occurrences no longer meets the criteria for recurring internal corrosion. The selected inspection locations will be periodically reviewed to validate their relevance and usefulness and adjusted as appropriate. Evaluation of the inspection results will include; (1) a comparison to the nominal wall thickness or previous wall thickness measurements to determine rate of corrosion degradation; (2) a comparison to the design minimum allowable wall thickness to determine the acceptability of the component for continued use; and (3) a determination of reinspection interval. A portion of these inspection locations will be selected with process conditions similar (e. g. flow, temperature) to those in buried portions of the piping to provide sufficient understanding of the condition of the buried piping.

2. Perform a minimum of 10 MIC degradation inspections for in scope aboveground piping in the Nonessential Cooling Water System every 24 months until the rate of MIC occurrences no longer meets the criteria for recurring internal corrosion. The selected inspection locations will be periodically reviewed to validate their relevance and usefulness and adjusted as appropriate. Evaluation of the inspection results will include (1) a comparison to the nominal wall thickness or previous wall thickness measurements to determine rate of corrosion degradation; (2) a comparison to the design minimum allowable wall thickness to determine the acceptability of the component for continued use; and (3) a determination of reinspection interval. A portion of these inspection locations will be selected with process conditions similar (e. g. flow, temperature) to those in buried portions of the piping to provide sufficient understanding of the condition of the buried piping.

3. Select an inspection method that will provide indication of suitable wall thickness to perform inspections on a representative sample of buried piping to supplement the aboveground piping inspection locations.

4. Perform visual inspections of the interior surface of buried portions of the Essential Cooling Water System and Nonessential Cooling Water System whenever the piping internal surface is made accessible due to maintenance and repair activities.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.13 Closed Treated Water Systems

The Closed Treated Water Systems program is an existing mitigative and condition monitoring program that manages the loss of material, cracking, and reduction of heat transfer in piping, piping components, piping elements, tanks, and heat exchangers exposed to a closed cycle cooling water environment. The Closed Treated Water Systems program includes (a) nitrite-based water treatment, including pH control and the use of corrosion inhibitors, to modify the chemical composition of the water such that the function of the equipment is maintained and such that the effects of corrosion are minimized; (b) chemical testing of the water to ensure that the water treatment program maintains the water chemistry within acceptable guidelines; and (c) inspections to determine the presence or extent of corrosion, stress corrosion cracking, or fouling. The inspections include existing visual inspections of the internal surface of the components performed whenever the system boundary is opened as well as new periodic inspections as described in the enhancement below. The Closed Treated Water Systems aging management program will be enhanced to:

1. Perform condition monitoring, including periodic visual inspections and non-destructive examinations, to verify the effectiveness of water chemistry control to mitigate aging effects. A representative sample of piping and components will be selected based on likelihood of corrosion, stress corrosion cracking, or fouling, and inspected at an interval not to exceed once in 10 years during the period of extended operation. The selection of components to be inspected will focus on locations which are most susceptible to age-related degradation, where practical.

This enhancement will be implemented prior to the period of extended operation.

A.2.1.14 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 aging management program is an existing condition monitoring program that manages the effects of loss of material on the bridge, bridge rails, bolting and trolley structural components for those cranes, hoists, and rigging beams that are within the scope of license renewal. The program also manages loss of preload of associated bolted connections. Procedures and controls implement the guidance on the control of overhead heavy load cranes specified in NUREG-0612, “Control of Heavy Loads at Nuclear Power Plants.” The program utilizes periodic inspections as described in the ASME B30 series of standards for inspection, monitoring, and detection of aging effects.

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems aging management program will be enhanced to:

1. Provide additional guidance to include inspection of structural components, rails, and bolting for loss of material due to corrosion; rails for loss of material due to wear; and bolted connections for loss of preload.

This enhancement will be implemented prior to the period of extended operation.

A.2.1.15 Compressed Air Monitoring

The Compressed Air Monitoring aging management program is an existing condition monitoring program that manages loss of material on piping and components in the compressed air systems. The Compressed Air Monitoring program includes monitoring of air moisture content and contaminants such that specified limits are maintained, and inspection of components for indications of loss of material due to corrosion.

This program is based on the LSCS response to NRC GL 88-14, “Instrument Air Supply Problems;” and utilizes guidance and standards provided by ANSI/ISA-S7.3, “Quality Standard for Instrument Air,” INPO’s Significant Operating Experience Report (SOER) 88-01, “Instrument Air System Failures;” and ASME OM-S/G-1998, Part 17, “Performance Testing of Instrument Air Systems in Light-Water Reactor Power Plants.” The Compressed Air Monitoring program activities implement the moisture content and contaminant criteria of ANSI/ISA-S7.3 (incorporated into ISA-S7.0.1-1996). Program activities include air quality checks at various locations to ensure that dew point, particulates, and hydrocarbons are maintained within the specified limits, and inspections of the internal surfaces of select compressed air system components for signs of loss of material due to corrosion.

The Compressed Air Monitoring aging management program will be enhanced to:

1. Inspect the internal surfaces of system filters, compressors, and after-coolers for signs of corrosion and corrosion products.

2. Perform analysis and trending of air quality monitoring results and visual inspection results.

3. Document deficiencies which are identified during visual inspections of the internal surfaces of system components in the corrective action program.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.16 Fire Protection

The Fire Protection aging management program is an existing condition monitoring and performance monitoring program that includes fire barrier visual inspections and low pressure carbon dioxide system visual inspections and functional tests to manage the identified aging effects. The fire barrier inspection program requires periodic visual inspection of fire barrier penetration seals, fire barrier walls, ceilings, floors, and other materials that perform a fire barrier function. Periodic visual inspection and functional testing of the fire rated doors and visual inspection of fire rated dampers is performed to ensure that their functionality is maintained. The program also includes visual inspections and periodic operability tests of the low pressure carbon dioxide fire suppression systems using the National Fire Protection Association Codes and Standards for guidance.

The Fire Protection aging management program will be enhanced to:

1. Perform periodic visual inspection of combustible liquid spill retaining curbs.

2. Perform periodic visual inspection for identification of corrosion that may lead to loss of material on the external surfaces of the low pressure carbon dioxide fire suppression systems.

3. Provide additional inspection guidance to identify aging effects as follows:

   a. Fire barrier walls, ceilings, and floors degradation such as spalling, cracking, and loss of material for concrete.

   b. Elastomeric fire barrier material degradation such as loss of material, shrinkage, separation from walls and components, increased hardness, and loss of strength.

4. Provide additional inspection guidance to identify degradation of fire barrier penetration seals for aging effects such as loss of material, cracking, increased hardness, shrinkage, and loss of strength.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.17 Fire Water System

The Fire Water System aging management program is an existing condition monitoring, performance monitoring, and preventive program that manages loss of material due to corrosion, including MIC, fouling, and flow blockage. The program manages these aging effects through the use of system pressure monitoring, system header flushing, buried ring header flow testing, pump performance testing, hydrant full flow flushing and flow verification, sprinkler and deluge system flushing and flow testing as well as flow testing and visual inspections performed using the guidance of NFPA 25, 2011 Edition.

The program applies to water-based fire protection systems that consist of sprinklers, fittings, valves, hydrants, hose stations, standpipes, pumps, and aboveground and buried piping and components. The program manages aging of fire protection system components exposed to raw water. Aging of the external surfaces of buried fire main piping is managed as described in the Buried and Underground Piping program.

Testing or replacement of sprinklers that have been in place for 50 years is performed using the guidance of NFPA 25, 2011 Edition.

The water-based fire protection system is normally maintained at required operating pressure and is monitored such that loss of system pressure is immediately detected and corrective actions initiated.

The Fire Water System aging management program will be enhanced to:

1. Perform volumetric examinations at five locations on the carbon steel aboveground fire water piping susceptible to microbiologically induced corrosion (MIC) every year to identify loss of material. Additional locations will be examined if these volumetric examinations or plant operating experience identify significant degradation. For through-wall leaks and material loss greater than 50 percent of nominal wall, four additional locations will be examined. Where the identified material loss is 30 percent to 50 percent of nominal wall thickness and the calculated remaining life is less than two years, two additional locations will be examined.

2. Perform visual inspections, for loss of material and flow obstructions, of the accessible header piping and sparger external surfaces for the deluge systems located within filter plenums on a once per refueling cycle frequency. The visual inspection will include verification that the piping and spargers are in their proper position and that there are no obstructions to the desired spray patterns.

3. Perform internal visual inspections of sprinkler and deluge system piping to identify internal corrosion and obstructions to flow. Followup volumetric examinations will be performed if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval.

The internal visual inspections will consist of the following:

a. Wet pipe sprinkler systems – 50 percent of the wet pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

b. Dry pipe sprinkler systems - Dry pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

c. Deluge systems - Deluge systems in scope for license renewal, except for the charcoal filter deluge systems, will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

   i. The in scope charcoal filter deluge systems will have visual internal inspections performed on one of the 11 systems every five years. If degraded conditions are identified, the inspections will be expanded to include all 11 charcoal filter systems every five years.

d. Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have additional tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect.

   i. These additional inspections, if required, will be performed in each five-year interval beginning five years prior to the period of extended operation.

   ii. This additional inspection consists of either a flow test or flush sufficient to detect potential flow blockage or a visual inspection of 100 percent of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect.

   iii. In addition, in each five-year interval of the period of extended operation, 20 percent of the length of piping segments that cannot be drained or piping segments that allow water to collect is subject to volumetric wall thickness inspections.

4. Perform obstruction evaluations when degraded conditions are identified by visual inspections, flow testing, or volumetric examinations. The obstruction evaluations will include an extent of condition determination, need for increased inspections, and followup examinations if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval.

5. Perform flow tests for hose stations at the hydraulically most limiting locations for each zone of the system on a five-year frequency to demonstrate the capability to provide the design pressure at required flow.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.18 Aboveground Metallic Tanks

The Aboveground Metallic Tanks aging management program includes outdoor tanks sited on soil or concrete and indoor large volume tanks containing water designed with internal pressures approximating atmospheric pressure that are sited on concrete. The program is an existing condition monitoring program which will be enhanced to provide for management of loss of material and loss of sealing for metallic tanks within the scope of the program. The Unit 1 and Unit 2 cycled condensate storage tanks are the only tanks within the scope of this program. These tanks are fabricated from aluminum plates and are not coated or insulated, and are not susceptible to cracking. The program includes caulking at the tank interface with the tank foundation as a preventive measure to mitigate corrosion. Visual inspections are performed to monitor degradation of the tank surfaces and caulking. Visual inspections of interior tank surfaces are performed to detect loss of material. The bottoms of the tanks are examined volumetrically. These inspections and examinations ensure that significant degradation is not occurring and that the intended function of the cycled condensate storage tanks is maintained during the period of extended operation.

The Aboveground Metallic Tanks aging management program will be enhanced to:

1. Perform a visual inspection of the tank shell, roof, and bottom interior surfaces for signs of loss of material on one of the cycled condensate storage tanks within five years prior to the period of extended operation. This inspection shall include both wetted and non-wetted surfaces and may be either direct visual inspection from inside the tanks or volumetric examination from outside the tank. A volumetric examination from outside the tank will include 25 percent of the tank surface area. Should the one-time inspection identify degradation, periodic inspections with an inspection frequency based on the rate of degradation will be established for both tanks.

2. Perform a visual inspection of the exterior surfaces of both cycled condensate storage tanks for loss of material each refueling interval.

3. Perform a volumetric examination of the tank bottom for both cycled condensate storage tanks for signs of loss of material whenever the tanks are drained. At a minimum, an inspection shall be performed within 10 years prior to the period of extended operation and subsequent inspections shall be performed in each 10-year period during the period of extended operation.

4. Perform an inspection of the caulking at the perimeter of the cycled condensate storage tank bases for signs of degradation each refueling interval.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.19 Fuel Oil Chemistry

The Fuel Oil Chemistry aging management program is an existing mitigative and condition monitoring program that includes activities which provide assurance that contaminants are maintained at acceptable levels in fuel oil for systems and components within the scope of license renewal. The Fuel Oil Chemistry program manages loss of material in piping, piping elements, piping components and tanks in a fuel oil environment. The fuel oil tanks within the scope of license renewal are maintained by monitoring and controlling fuel oil contaminants in accordance with the Technical Specifications, Technical Requirements Manual, and ASTM guidelines. Fuel oil sampling and analysis is performed in accordance with approved procedures for new fuel oil and stored fuel oil. Fuel oil tanks are periodically drained of accumulated water and sediment, cleaned, and internally inspected. These activities effectively manage the effects of aging by maintaining potentially harmful contaminants at low concentrations.

The Fuel Oil Chemistry aging management program will be enhanced to:

1. Perform periodic (quarterly) sampling and analysis for water and sediment content, particulate concentration, and the levels of microbiological organisms for diesel fuel storage tanks 0DO01T, 1DO01T, and 2DO01T.

2. Perform periodic (quarterly) sampling and analysis for water and sediment content, particulate concentration, and the levels of microbiological organisms for HPCS diesel fuel storage tanks 1DO02T and 2DO02T.

3. Perform periodic (quarterly) sampling and analysis for water and sediment content and the levels of microbiological organisms for diesel generator day tanks 0DO02T, 1DO05T, and 2DO05T.

4. Perform periodic (quarterly) sampling and analysis for water and sediment content and the levels of microbiological organisms for HPCS diesel day tanks 1DO04T and 2DO04T.

5. Perform periodic (quarterly) sampling and analysis for water and sediment content, particulate concentration, and the levels of microbiological organisms for diesel fire pump day tanks 0FP01TA and 0FP01TB.

6. Perform periodic internal inspections of diesel fire pump day tanks 0FP01TA and 0FP01TB at least once during the 10-year period prior to the period of extended operation, and at least once every 10 years during the period of extended operation. Each diesel fuel tank will be drained and cleaned, the internal surfaces visually inspected (if physically possible), and, if evidence of degradation is observed during inspections, or if visual inspection is not possible, these diesel fuel tanks will be volumetrically inspected.

7. Perform volumetric inspection of diesel fuel storage tanks 0DO01T, 1DO01T, and 2DO01T; HPCS diesel fuel storage tanks 1DO02T and 2DO02T; diesel generator day tanks 0DO02T, 1DO05T, and 2DO05T; and HPCS diesel day tanks 1DO04T and 2DO04T if evidence of degradation is observed during visual inspection, or if visual inspection is not possible.

8. Perform periodic (quarterly) trending of water and sediment content, particulate concentration, and the levels of microbiological organisms for all fuel oil tanks within the scope of the program.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.20 Reactor Vessel Surveillance

The Reactor Vessel Surveillance aging management program is an existing condition monitoring program that manages the loss of fracture toughness due to neutron irradiation embrittlement of the reactor vessel beltline materials. The program meets the requirements of 10 CFR 50, Appendix H. The program manages the surveillance capsules in each unit and ensures that the specimen exposure, capsule withdrawal, sample testing, and capsule storage meet the requirements of 10 CFR 50, Appendix H and ASTM E-185. The program evaluates neutron embrittlement by projecting Upper-Shelf Energy (USE) for reactor materials and impact on Adjusted Reference Temperature for the development of pressure-temperature limit curves. Embrittlement evaluations are performed in accordance with Regulatory Guide 1.99, Revision 2. The Reactor Vessel Surveillance program is part of the BWRVIP Integrated Surveillance Program (ISP) described in BWRVIP-86-A and approved by the NRC staff. The schedule for removing surveillance capsules is in accordance the timetable specified in BWRVIP-86-A for the current license term and for the period of extended operation.

The program monitors plant operating conditions to ensure appropriate steps are taken if reactor vessel exposure conditions are altered; such as the review and updating of 60-year fluence projections to support upper-shelf energy calculations and pressure-temperature limit curves. The program also includes condition monitoring by removal and analysis of surveillance capsules as part of the BWRVIP ISP. These measures are effective in detecting the extent of embrittlement to prevent significant degradation of the reactor pressure vessel during the period of extended operation.

A.2.1.21 One-Time Inspection

The One-Time Inspection aging management program is a new condition monitoring program that will be used to verify the system-wide effectiveness of the Water Chemistry (A.2.1.2) program, Fuel Oil Chemistry (A.2.1.19) program, and Lubricating Oil Analysis (A.2.1.26) program which are designed to prevent or minimize aging to the extent that it will not cause a loss of intended function during the period of extended operation. The program manages loss of material, cracking, and reduction of heat transfer in piping, piping components, piping elements, heat exchangers, and other components within the scope of license renewal. The program provides inspections focusing on locations that are isolated from the flow stream, that are stagnant, or that have low flow for extended periods and are susceptible to the gradual accumulation or concentration of agents that promote certain aging effects. The inspections will include a representative sample of the system population and will focus on the bounding or lead components most susceptible to aging due to time in service, and severity of operating conditions. The program either verifies that unacceptable degradation is not occurring or triggers additional actions that will assure the intended function of affected components will be maintained during the period of extended operation.

This new aging management program will be implemented prior to the period of extended operation. The one-time inspections will be performed within the 10 years prior to entering the period of extended operation.

A.2.1.22 Selective Leaching

The Selective Leaching aging management program is a new condition monitoring program that will include one-time visual inspections of a representative sample of susceptible components within the scope of license renewal. These one-time inspections will include visual examinations, coupled with either hardness measurement or other mechanical examination techniques such as destructive testing, scraping, or chipping, of selected components that may be susceptible to selective leaching. This is to determine whether loss of material due to selective leaching is occurring, and whether the process will affect the ability of the components to perform their intended function for the period of extended operation. Metallurgical evaluation may also be performed. If loss of material is identified, further evaluation of the extent of condition will be performed under the corrective action program, which may include an expansion of the sample size and locations. Components in the scope of this program include components constructed of gray cast iron or copper alloy with 15 percent or greater zinc, that are exposed to raw water, treated water, closed cycle cooling water, waste water, and soil environments.

This new aging management program will be implemented prior to the period of extended operation. One-time inspections will be conducted within the five years prior to entering the period of extended operation.

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 aging management program is a new condition monitoring program that will manage the aging effect of cracking in ASME Code Class 1 small-bore piping that is less than nominal pipe size (NPS) 4-inches, and greater than or equal to NPS 1-inch. The program implements one-time inspection of a sample of piping full penetration (butt) and partial penetration (socket) welds that are susceptible to cracking using volumetric examinations. The inspection sample size will include at least 3 percent of the population of program butt welds with a maximum of 10 program butt welds for each LSCS unit, and at least 3 percent of the population of program socket welds with a maximum of 10 program socket welds for each LSCS unit. Inspection of socket welds will be performed by a volumetric examination technique demonstrated to be capable of detecting cracking. If such a volumetric examination technique is not available by the time of the inspections, the examination method will be by destructive examination. Inspections required by the program will augment ASME Code, Section XI requirements.

Cracking of ASME Code Class 1 small-bore piping due to stress corrosion cracking, cyclical (including thermal, mechanical, and vibration fatigue) loading, thermal stratification or thermal turbulence has not been experienced at LSCS Units 1 and 2. Therefore, this one-time inspection program is applicable and adequate to manage this aging effect during the period of extended operation. A plant-specific periodic inspection program will be implemented if evidence of cracking caused by IGSCC or fatigue is revealed in ASME Class 1 small-bore piping.

This new aging management program will be implemented prior to the period of extended operation. One-time inspections will be performed within the six years prior to entering the period of extended operation.

A.2.1.24 External Surfaces Monitoring of Mechanical Components

The External Surfaces Monitoring of Mechanical Components aging management program is a new condition monitoring program that directs visual inspections of external surfaces of components be performed during system inspections and walkdowns. The program consists of periodic visual inspection of metallic and elastomeric components such as piping, piping components, ducting, and other components within the scope of license renewal. The program manages aging effects of metallic and elastomeric materials through visual inspection of external surfaces for evidence of loss of material, cracking, and changes in material properties. When appropriate for the component and material, visual inspections are supplemented by physical manipulation to detect hardening and loss of strength of elastomers.

The External Surfaces Monitoring of Mechanical Components program includes visual inspection of the metallic jacketing on thermal insulation to ensure that the jacketing is performing its function to protect the insulation from damage, such as in-leakage of moisture, that could reduce the thermal resistance of the insulation.

Inspections are performed at a frequency not to exceed one refueling cycle. This frequency accommodates inspections of components that may be in locations that are normally only accessible during outages. Surfaces that are not readily visible during plant operations and refueling outages are inspected when they are made accessible and at such intervals that would ensure the components' intended functions are maintained.

A sample of outdoor component surfaces that are insulated and a sample of indoor insulated components exposed to condensation (due to the in scope component being operated below the dew point), are periodically inspected, under the insulation, every 10 years during the period of extended operation. Inspections subsequent to the initial inspection will consist of examination of the exterior surface of the insulation for indications of damage to the jacketing or protective outer layer of the insulation if the initial inspection verifies no loss of material beyond that which could have been present during initial construction. If the external visual inspections of the insulation reveal damage to the exterior surface of the insulation or if there is evidence of water intrusion through the insulation, then periodic inspections under insulation to detect corrosion under insulation will continue. Removal of tightly-adhering insulation that is impermeable to moisture is not required unless there is evidence of damage to the moisture barrier.

The external surfaces of components that are buried are inspected via the Buried and Underground Piping (A.2.1.28) program. The external surface of aboveground tanks is inspected via the Aboveground Metallic Tanks (A.2.1.18) program.

This new aging management program will be implemented prior to the period of extended operation.

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 aging management program is a new condition monitoring program that will consist of inspections of the internal surfaces of metallic and elastomeric components such as piping, piping components and piping elements, ducting components, tanks, heat exchanger components, elastomers, and other components that are exposed to environments of condensation, diesel exhaust, and waste water. These internal inspections will be performed during the periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. At a minimum, in each 10-year period during the period of extended operation, a representative sample of 20 percent of the population (defined as components having the same combination of material, environment, and aging effect) or a maximum of 25 components per population will be inspected. Where practical, the inspections will focus on the bounding or lead components most susceptible to aging because of time in service and severity of operating conditions. Opportunistic inspections will continue in each period even after meeting the sampling limit.

The program will manage the aging effects of loss of material, reduction of heat transfer, and cracking for metallic components. The program will also manage the aging effects of loss of material, hardening and loss of strength, and change in material properties for elastomeric components. The program will include visual inspections to ensure that existing environmental conditions are not causing material degradation that could result in a loss of the component's intended function. For certain materials, such as elastomers, physical manipulation to detect hardening or loss of strength will be used to supplement the visual examinations conducted under this program.

In addition, a review of LSCS operating experience has revealed instances of recurring internal corrosion in plant floor drain piping that is within the scope of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. This program will include periodic inspections on this population of carbon steel piping in the floor drain systems to ensure that recurring aging effects are adequately managed.

This new aging management program will be implemented prior to the period of extended operation.

A.2.1.26 Lubricating Oil Analysis

The Lubricating Oil Analysis aging management program is an existing condition monitoring program that provides monitoring of oil condition to manage loss of material and reduction of heat transfer in piping, piping components, piping elements, heat exchangers, and tanks within the scope of license renewal exposed to a lubricating oil environment. Sampling, analysis, and condition monitoring activities identify specific wear products and verify that the contamination levels (primarily water and particulates) and the physical properties of lubricating oil are maintained within acceptable limits to ensure that component intended functions are maintained.

A.2.1.27 Monitoring of Neutron-Absorbing Materials Other Than Boraflex

The Monitoring of Neutron-Absorbing Materials Other Than Boraflex aging management program is an existing condition monitoring program that includes periodic inspection and analysis of test coupons of the neutron-absorbing material in the spent fuel storage racks to determine if the neutron-absorbing capability of the material has degraded. This program ensures that a five percent sub-criticality margin in the spent fuel pool is maintained during the period of extended operation by monitoring for loss of material, changes in dimension, and loss of neutron-absorption capacity of the material.

The Monitoring of Neutron-Absorbing Materials Other Than Boraflex aging management program will be enhanced to:

1. Maintain the test coupon exposure such that it is bounding for the neutron-absorbing material in all spent fuel racks, by relocating the coupon tree to a different spent fuel rack cell location each cycle and by surrounding the coupons with a greater number of freshly discharged fuel assemblies than that of any other cell location.

This enhancement will be implemented prior to the period of extended operation.

A.2.1.28 Buried and Underground Piping

The Buried and Underground Piping aging management program is an existing preventive, mitigative, and condition monitoring program that manages the external surface aging effects of cracking and loss of material for buried and underground piping. The program manages aging through preventive, mitigative (e.g., coatings, backfill quality, and cathodic protection), and inspection activities for piping and components within the scope of license renewal.

External inspection of buried components will occur opportunistically when they are excavated for any reason.

The Buried and Underground Piping aging management program will be enhanced to:

1. Manage cracking for stainless steel piping, utilizing a method that has been demonstrated to be capable of detecting cracking, whenever coatings are removed and expose the base material.

2. Ensure all underground carbon steel Essential Cooling Water System and Nonessential Cooling Water System piping and components within the scope of license renewal are coated in accordance with Table 1 of NACE SP0169-2007.

3. Define acceptable coating conditions as coating exhibiting either no evidence of degradation, or, the type and extent of coating damage evaluated as insignificant by an individual possessing a NACE Coating Inspector Program Level 2 or 3 operator qualification, or by an individual who has attended the Electric Power Research Institute (EPRI) Comprehensive Coatings Course and completed the EPRI Buried Pipe Condition Assessment and Repair Training Computer Based Training Course.

4. Perform inspection quantities of buried piping within the scope of license renewal in accordance with LR-ISG-2011-03, Element 4.b and Table 4a, during each 10-year period, beginning 10 years prior to the period of extended operation. The number of inspections of buried piping will be based upon the as-found results of cathodic protection system availability and effectiveness.

5. Perform direct visual inspections of underground Essential Cooling Water System and Nonessential Cooling Water System piping within the scope of license renewal during each 10-year period, beginning 10 years prior to the period of extended operation.

6. Double the inspection sample sizes within the affected piping categories if adverse indications are detected during inspection. If adverse indications are found in the expanded sample, an analysis will be conducted to determine the extent of condition and extent of cause. The size of the followup inspections will be determined based on the analysis. Timing of the additional inspections will be based on the severity of the identified degradation and the consequences of leakage. In all cases, the additional inspections will be

performed within the same 10-year inspection interval in which the original adverse indication was identified. Expansion of sample size may be limited by the extent of piping subject to the observed degradation mechanism.

7. Use only the -850mV polarized potential criterion specified in NACE SP0169-2007 for acceptance criteria for steel piping and determination of cathodic protection system effectiveness in performing cathodic protection surveys. Alternatively, soil corrosion probes may also be used to demonstrate cathodic protection effectiveness during the annual surveys. An upper limit of -1200mV for pipe-to-soil potential measurements of coated pipes will also be established, so as to preclude potential damage to coatings.

8. Conduct an extent of condition evaluation if observed coating damage caused by non-conforming backfill has been evaluated as significant. The extent of condition evaluation will be conducted to ensure that the as-left condition of backfill in the vicinity of the observed damage will not lead to further degradation.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.29 ASME Section XI, Subsection IWE

The ASME Section XI, Subsection IWE aging management program is an existing condition monitoring program based on ASME Code and complies with the provisions of 10 CFR 50.55a. The program consists of periodic visual and volumetric examination of pressure-retaining components of steel and concrete containments for signs of degradation, assessment of damage, and corrective actions. The program includes aging management of surfaces and components such as the containment liner plate surfaces and components, including its integral attachments, drywell floor liner, downcomers and bracing, penetration sleeves and closures, vacuum breaker piping and valves, pressure-retaining bolting for containment closure, personnel airlock and equipment hatches, drywell head, and other pressure-retaining components for loss of material, loss of preload, loss of leak tightness, and fretting or lockup. LaSalle County Station primary containments are BWR Mark II concrete containments. High strength containment closure bolting susceptible to cracking is not used; therefore, surface examination to detect cracking is not applicable.

Examination methods include visual and volumetric testing as required by ASME Section XI, Subsection IWE, as approved in 10 CFR 50.55a. Observed conditions that have the potential for impacting an intended function are evaluated for acceptability in accordance with ASME requirements or corrected in accordance with corrective action program.

The ASME Section XI, Subsection IWE aging management program will be enhanced to:

1. Provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation

and failure of structural bolting.

2. If leakage from the reactor cavity pool drain line welds exists, then perform ultrasonic thickness measurements on the Unit 2 drywell liner at 0 and 180 degrees for several feet below elevation 813. The inspections will begin in 2015 and a periodic inspection frequency will be established based on the inspection results.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.30 ASME Section XI, Subsection IWL

The ASME Section XI, Subsection IWL aging management program is an existing condition monitoring program that consists of (a) periodic visual inspection of concrete surfaces for reinforced and prestressed concrete containments; and (b) periodic visual inspection and sample tendon testing of unbonded post-tensioning systems for prestressed concrete containments for signs of degradation, assessment of damage, and corrective actions, and testing of the tendon corrosion protection medium and free water. Measured tendon lift-off forces are compared to predicted tendon forces calculated in accordance with RG 1.35.1.

Reinforced concrete surfaces are inspected for material degradation, including loss of material, cracking, increase in porosity and permeability, and loss of bond. A sample of each tendon wire type (vertical and hoop) for the post-tensioning system is tested for loss of prestress. One tendon wire of each type is also examined for loss of material and subject to physical testing to determine yield strength, ultimate tensile strength, and elongation. The end anchorage for the unbonded post-tensioning system is inspected for loss of material.

This program is in accordance with ASME Section XI, Subsection IWL, as approved in 10 CFR 50.55a.

The ASME Section XI, Subsection IWL aging management program will be enhanced to:

1. Explicitly require that areas of concrete deterioration and distress be recorded in accordance with the guidance provided in ACI 349.3R.

2. Include quantitative acceptance criteria, based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R, that will be used to augment the qualitative assessment of the Responsible Engineer.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.31 ASME Section XI, Subsection IWF

The ASME Section XI, Subsection IWF aging management program is an existing condition monitoring program that consists of periodic visual examinations of ASME Class 1, 2, 3, and MC piping and component supports and high-strength structural bolting for signs of degradation (such as loss of material, loss of mechanical function, and loss of preload), evaluation, and corrective actions. The program is implemented through corporate and station procedures, in accordance with the requirements of the ASME Code, Section XI, Subsection IWF, as approved in 10 CFR 50.55a. The monitoring methods are effective in detecting the applicable aging effects and the frequency of monitoring is adequate to prevent significant degradation.

The ASME Section XI, Subsection IWF aging management program will be enhanced to:

1. Provide guidance for proper specification of bolting material, storage, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting. Requirements for high strength bolts shall include the preventive actions for storage, lubricants, and stress corrosion cracking potential discussed in Section 2 of RCSC (Research Council on Structural Connections) publication “Specification for Structural Joints Using ASTM A325 or A490 Bolts.” Lubricants that contain molybdenum disulfide (MoS_2) shall not be applied to high strength bolts within the scope of license renewal.

2. Provide guidance, regarding the selection of supports to be inspected on subsequent inspections, when a support is repaired in accordance with the corrective action program. The enhanced guidance will ensure that the supports inspected on subsequent inspections are representative of the general population.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.32 10 CFR Part 50, Appendix J

The 10 CFR Part 50, Appendix J aging management program is an existing condition monitoring program that monitors leakage rates through the containment pressure boundary, including the containment liner and welds, penetrations, fittings, and other access openings, in order to detect degradation of the containment pressure boundary. Corrective actions are taken if leakage rates exceed acceptance criteria. The program provides for aging management of pressure boundary degradation due to aging effects such as loss of material, loss of leak tightness, or loss of preload in various systems penetrating containment. The program also detects loss of sealing due to degradation of gaskets and seals. Consistent with the current licensing basis, the containment leak rate tests are performed in accordance with the regulations and guidance provided in 10 CFR Part 50, Appendix J, Option B, Regulatory Guide 1.163, “Performance-Based Containment Leak-Test Program,” NEI 94-01, Revision 0 “Industry Guideline for Implementing

Performance-Based Option of 10 CFR Part 50, Appendix J," and ANSI/ANS 56.8, "Containment System Leakage Testing Requirements."

A.2.1.33 Masonry Walls

The Masonry Walls aging management program is an existing condition monitoring program that is implemented as part of the Structures Monitoring (A.2.1.34) program. Masonry wall condition monitoring is based on guidance provided in IE Bulletin 80-11, "Masonry Wall Design," and NRC Information Notice 87-67, "Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11," and is implemented through station procedures.

The Masonry Walls program manages the effects of loss of material and cracking of concrete masonry walls, and will inspect for separation, along with gaps between the supports and masonry walls. The program relies on periodic visual inspections on an interval not to exceed five years to monitor and maintain the condition of masonry walls within the scope of license renewal. Masonry walls that are considered fire barriers are also managed by the Fire Protection (A.2.1.16) program.

The Masonry Walls aging management program will be enhanced to:

1. Provide guidance for inspection of masonry walls for separation and gaps between the supports for masonry walls.

2. Require that personnel performing inspections and evaluations meet the qualifications described in ACI 349.3R.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.34 Structures Monitoring

The Structures Monitoring aging management program is an existing condition monitoring program that was developed to implement the requirements of 10 CFR 50.65 and is based on NUMARC 93-01, Revision 2 "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and Regulatory Guide 1.160, Revision 2 "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." The program includes elements of the Masonry Walls (A.2.1.33) program and the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (A.2.1.35) program. The program consists of periodic inspection and monitoring the condition of structures and structural component supports, to ensure that aging degradation leading to loss of intended functions will be detected and the extent of degradation can be determined. The inspections are conducted on a frequency not to exceed five years. Groundwater will be periodically sampled on a five-year frequency, and tested to ensure the groundwater remains non-aggressive.

The Structures Monitoring aging management program will be enhanced to:

1. Add the following components and commodities:

    a. Pipe, electrical, and equipment component support members

    b. Pipe whip restraints and jet impingement shields

    c. Panels, racks, cabinets, and other enclosures

    d. Sliding surfaces

    e. Sumps

    f. Electrical cable trays and conduits

    g. Electrical duct banks

    h. Tube tracks

    i. Transmission tower (including takeoff towers) and foundation (including cycled condensate storage tank foundations)

    j. Penetration seals and sleeves

    k. Blowout panels

    l. Permanent drywell shielding

    m. Transformer foundation

    n. Bearing pads

    o. Compressible joints

    p. Hatches, plugs, handholes, and manholes

    q. Metal components (decking, vent stack, and miscellaneous steel)

    r. Building features – doors and seals, bird screens, louvers, windows, and siding

    s. Concrete curbs and anchors

2. Provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting.

3. Revise storage requirements for high strength bolts to include recommendations of Research Council on Structural Connections (RCSC) Specification for Structural Joints Using High Strength Bolts, Section 2.0.

4. Require acceptance and evaluation of structural concrete using quantitative criteria based on Chapter 5 of ACI 349.3R.

5. Monitor raw water and ground water chemistry on a frequency not to exceed five years for pH, chlorides, and sulfates and verify that it remains non-aggressive, or evaluate results exceeding criteria to assess impact, if any, on below-grade concrete.

6. Monitor concrete for increase in porosity and permeability, inspection of accessible sliding surfaces for indication of significant loss of material due to wear or corrosion, debris, or dirt.

7. For in scope structures, examine representative samples of the exposed portions of the below grade concrete when excavated for any reason.

8. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R with respect to knowledge of inservice inspection of concrete and visual acuity requirements.

9. Clarify that loose bolts and nuts and cracked high strength bolts are not acceptable unless accepted by engineering evaluations.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.35 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants aging management program is an existing condition monitoring program implemented through the Structures Monitoring (A.2.1.34) program. The program consists of inspection and surveillance programs to provide management of aging for slopes, canals, intake structure, submerged portions of the Core Standby Cooling System Pond, and other water-control structure features associated with emergency cooling water systems or flood protection based on RG 1.127, Revision 1. The program also includes structural steel and structural bolting associated with water-control structures, steel piles, and sheeting required for the stability of embankments and channel slopes, and miscellaneous steel, and trash racks. There are no dams, wood piles, or sluice gates associated with the emergency cooling water systems or flood protection of the plant based on RG 1.127, Revision 1.

The Structures Monitoring program is an existing program which will be enhanced to include management of aging effects for water-control structures. The program monitors the condition of the Lake Screen House and the safety-related portions of the Cooling Lake. The Structures Monitoring program addresses age-related deterioration, degradation due to extreme environmental conditions, and the effects of natural phenomena that may affect the intended function of the water-control structures. The program is used to manage conditions such as, loss of material, loss of preload, cracking, increase in porosity and permeability, loss of strength, or loss of form. Elements of the program are designed to detect degradation and take corrective actions to prevent the loss of an intended function.

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants aging management program will be enhanced to:

1. Include monitoring of the following:
   a. Submerged Core Standby Cooling System Pond and Intake Flume (includes earthen walls, south flume concrete retaining wall, and north flume sheet piling retaining wall)
   b. Core Standby Cooling System outfall structure
   c. Bar racks and miscellaneous steel
   d. Shad net anchors
   e. Lake Screen House (includes service water tunnel)
2. Monitor raw water and ground water chemistry at least once every five years for pH, chlorides, and sulfates and verify that it remains non-aggressive, or evaluate results exceeding criteria to assess impact, if any, on buried or submerged concrete.
3. Provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting, and preventative actions for storage of materials to prevent stress corrosion cracking.
4. Require acceptance and evaluation of structural concrete using quantitative criteria based on Chapter 5 of ACI 349.3R.
5. Require inspection of accessible in scope portions of the Cooling Lake and Lake Screen House immediately following the occurrence of significant natural phenomena, which includes intense local rainfalls and large floods.
6. Require:
   a. The evaluation of the acceptability of inaccessible areas when conditions exist in the accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas.
   b. Examination of the exposed portions of the below grade concrete when excavated for any reason.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.36 Protective Coating Monitoring and Maintenance Program

The Protective Coating Monitoring and Maintenance Program is an existing mitigative and condition monitoring program that manages the effects of loss of coating integrity of Service Level I coatings inside primary containment. The Protective Coating Monitoring and Maintenance Program manages coating system selection, application, visual inspections, assessments, repairs, and maintenance of Service Level I protective coatings as defined in RG 1.54, Revision 1 or latest revision.

Service Level I coatings will prevent or minimize the loss of material due to corrosion but these coatings are not credited for managing the effects of corrosion for the carbon steel containment liners and components. This program ensures that the Service Level I coatings maintain adhesion so as to not affect the intended function of the emergency core cooling systems (ECCS) suction strainers.

The program also provides controls over the amount of unqualified coating which is defined as coating inside the primary containment that has not passed the required laboratory testing, including irradiation and simulated design basis accident (DBA) conditions. Unqualified coating may fail in a way to affect the intended function of the ECCS suction strainers. Therefore, the quantity of unqualified coating is controlled to ensure that the amount of unqualified coating in the primary containment is kept within acceptable design limits.

A.2.1.37 Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new condition monitoring program that will be used to manage the effects of reduced insulation resistance of the insulation material for non-EQ cables and connections during the period of extended operation. Accessible cables and connections located in adverse localized environments will be visually inspected at least once every 10 years for cable jacket and connection insulation surface anomalies, such as embrittlement, discoloration, cracking, melting, swelling, or surface contamination that could indicate incipient conductor insulation aging degradation from temperature, radiation, or moisture. 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.

This new program will be implemented prior to the period of extended operation. In addition, the first inspections will be completed prior to the period of extended operation.

A.2.1.38 Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits aging management program is a new condition monitoring program that will be used to manage the effects of reduced insulation resistance of non-EQ cable and connection insulation in instrumentation circuits with sensitive, high-voltage, low-level current signals. The program applies to the in scope portions of the Neutron Monitoring System, the Process Radiation Monitoring System, and the Area Radiation Monitoring System. The circuits for these instruments are located in areas where the cables and connections could be exposed to adverse localized environments caused by temperature, radiation, or moisture. These adverse localized environments can result in reduced insulation resistance causing increases in leakage currents. Other instrument circuits in the Neutron Monitoring System, Process Radiation Monitoring System, and Area Radiation Monitoring System are not in scope of this aging management program either because they are managed by the Environmental Qualification (EQ) of Electric Components program; they do not perform a license renewal intended function; or they are not sensitive high voltage, low-level signal circuits.

Calibration testing will be performed for the in scope circuits when the cables are included as part of the calibration circuit. The calibration results will be reviewed to provide an indication of the existence of aging effects based on acceptance criteria for instrumentation circuit performance. Review of results obtained during normal calibration may detect severe aging degradation prior to the loss of the cable and connection intended function. A proven cable test (such as insulation resistance tests, time domain reflectometry tests, or other testing judged to be effective in determining cable system insulation condition) will be performed for the in scope circuits when the cables are not included as part of the calibration.

This new program will be implemented prior to the period of extended operation. In addition, the first review of calibration or surveillance results and cable test results will be completed prior to the period of extended operation. Cable test frequency will be based on engineering evaluation and will be performed at least once every 10 years. Calibration and assessment of results will be performed at least once every 10 years during the period of extended operation.

A.2.1.39 Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

The Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new condition monitoring program that will be used to manage the effects of reduced insulation resistance of non-EQ, in scope, inaccessible power cables. For this program, power is defined as greater than or equal to 400 V. These inaccessible power cables may at times be exposed to significant moisture. Power cable exposure to significant moisture may cause reduced insulation resistance that can potentially lead to failure of the cable's insulation system.

The cables within the scope of this program will be tested using one or more proven tests for detecting reduced insulation resistance of the cable's insulation system due to wetting or submergence, such as dielectric loss (dissipation factor or power factor), AC voltage withstand, partial discharge, step voltage, time domain reflectometry, insulation resistance and polarization index, line resonance analysis, or other testing that is state-of-the-art at the time the test is performed. The cables will be tested at least once every six years. More frequent testing may occur based on test results and operating experience. The first tests will be completed prior to the period of extended operation.

Periodic actions will be taken to prevent inaccessible cables from being exposed to significant moisture. Manholes associated with the cables included in this program will be inspected for water collection with subsequent corrective actions (e.g., water removal), as necessary. Prior to the period of extended operation, the frequency of inspections for accumulated water will be established and adjusted based on plant-specific operating experience with cable wetting or submergence, including water accumulation over time and event driven occurrences such as heavy rain or flooding. The inspection includes direct observation that cables are not wetted or submerged, that cables/splices and cable support structures are intact, and dewatering/drainage systems (i.e., sump pumps) and associated alarms operate properly. Operation of dewatering devices will be verified prior to any known or predicted heavy rain or flooding event. The first inspections will be completed prior to the period of extended operation. During the period of extended operation, the inspections will occur at least annually.

This new aging management program will be implemented prior to the period of extended operation.

A.2.1.40 Metal Enclosed Bus

The Metal Enclosed Bus aging management program is an existing condition monitoring program that will be enhanced to manage the identified aging effects of in scope metal enclosed bus during the period of extended operation. The internal portions of the accessible bus enclosure assemblies are inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulation is visually inspected for signs of reduced insulation resistance, such as embrittlement, cracking, chipping, melting, discoloration, swelling, or surface contamination which may indicate overheating or aging degradation. The internal bus insulating supports are visually inspected for structural integrity and signs of cracks. External surfaces are visually inspected for loss of material due to general, pitting, and crevice corrosion. Enclosure assembly elastomers are visually inspected for surface cracking, crazing, scuffing, dimensional change, shrinkage, discoloration, hardening, and loss of strength. A sample of accessible bolted connections is inspected for increased resistance of connection by measuring the connection resistance using a micro-ohmmeter. The sample will be of 20 percent of the accessible metal enclosed bus bolted connection population with a maximum sample size of 25.

The inspections and resistance measurements will be performed at least once every 10 years for indications of aging degradation. The Metal Enclosed Bus aging management program will be enhanced prior to the period of extended operation.

The Metal Enclosed Bus program will be enhanced to:

1. Specify internal inspections will be performed for accessible non-segregated bus duct sections that are in scope for license renewal.

2. Clarify requirements for visual inspections of internal portions (bus enclosure assemblies); bus insulation; internal bus insulating supports; accessible gaskets, boots and sealants; and bus duct external surfaces.

3. Specify a sample size of 20 percent of the accessible bolted connection population, with a maximum sample size of 25, will be inspected for increased resistance of connection by either thermography or measuring the connection resistance using a micro ohmmeter.

4. Specify an inspection frequency of at least every 10 years.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.41 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new condition monitoring program. The program will implement one-time testing of a representative sample of non-EQ electrical cable connections to ensure that either increased resistance of connection is not occurring or that the existing preventive maintenance program is effective such that a periodic inspection program is not required. This one-time program will provide additional confirmation to support industry operating experience that shows that electrical connections have not experienced a high degree of failures and that existing installation and maintenance practices are effective. This one-time program will also confirm that there are no aging effects requiring management during the period of extended operation. A representative sample of non-EQ electrical cable connections will be selected for one-time testing considering voltage level (medium and low voltage), circuit loading (high loading), connection type, and location (high temperature, high humidity, and vibration). The sample tested will be 20 percent of the population with a maximum sample size of 25 connections. The specific type of test performed will be a proven test for detecting increased resistance of connections, such as thermography, contact resistance measurement, or another appropriate test.

This new aging management program will be implemented prior to the period of extended operation. The one-time tests will be completed prior to the period of extended operation.

A.2.2 Plant-Specific Aging Management Programs

This section provides summaries of the plant-specific programs credited for managing the effects of aging.

A.2.2.1 Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program

The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program is a new condition monitoring program that performs periodic visual inspections of internal coatings of in scope components. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program manages the loss of coating integrity in heat exchangers, piping, piping components, piping elements, strainer bodies, and tanks.

The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program will include periodic visual inspections to verify the integrity of internal coatings designed to adhere to and protect the base metal. The maximum interval of subsequent coating inspections will comply with Table 4a of GALL Report AMP XI.M42 in draft LR-ISG-2013-01 dated January 6, 2014 (ADAMS Accession No. ML13262A442). The training and qualification of individuals performing coating inspections is conducted in accordance with ASTM international standards endorsed in RG 1.54.

Inspections are performed for signs of coating failures and precursors to coating failures including peeling, delamination, blistering, cracking, flaking, chipping, rusting, and mechanical damage. When acceptance criteria are not met, visual inspection is supplemented by additional testing such adhesion testing or other inspection technique as determined by the qualified inspector to accurately assess coating condition. Adhesion testing, when required by the coating specialist to determine the cause of failure, will be performed using international standards. A coatings specialist qualified to ASTM D-7108 will evaluate the results of coating inspections. Inspection results that do not satisfy established acceptance criteria are entered into the LSCS 10 CFR 50, Appendix B corrective action program. The corrective action program ensures that conditions adverse to quality are promptly corrected. Corrective actions may include coating repair or replacement prior to the component being returned to service.

This new aging management program will be implemented prior to the period of extended operation. Baseline inspections will occur in the 10-year period prior to the period of extended operation.

A.3.0 NUREG-1801 Chapter X Aging Management Programs

A.3.1 Evaluation of Chapter X Aging Management Programs

Aging management programs evaluated in Chapter X of NUREG-1801 are associated with Time-Limited Aging Analysis for metal fatigue of the reactor coolant pressure boundary, concrete containment tendon prestress, and environmental qualification (EQ) of electric components. These programs are evaluated in this section.

A.3.1.1 Fatigue Monitoring

The Fatigue Monitoring aging management program is an existing preventive program that manages fatigue damage of reactor coolant pressure boundary and other components subject to the reactor coolant, treated water, steam, and air-indoor uncontrolled environments.

The Fatigue Monitoring program includes monitoring and tracking of the critical thermal, pressure, and seismic transients that occur during plant operations to ensure that the cumulative usage factor (CUF) for each analyzed component does not exceed the design limit of 1.0 through the period of extended operation. The program includes monitoring of the transients specified in Technical Specification 5.5.5, Component Cyclic or Transient Limits, UFSAR Table 5.2-4, Plant Events, and UFSAR Table 3.9-24, Applicable Thermal Transients. These transients are further defined in the following General Electric drawings: Unit 1 Reactor Vessel Thermal Cycles, Unit 2 Reactor Vessel Thermal Cycles, and Reactor Vessel Nozzle Thermal Cycles.

The program requires comparison of the actual event parameters to the applicable design transient definitions to ensure the actual transients are bounded by the design transients. The program also includes counting of the operational transients to ensure that the cumulative number of occurrences of each transient type is maintained below the most limiting number of cycles used in the Class 1 fatigue analyses, which is the cycle limit for each transient type. Maintaining the cumulative cycle counts below the analyzed cycle limits ensures that the CUF does not exceed of 1.0. The fatigue analyses may be revised to account for increased numbers of cycles or increased transient severity as necessary to ensure that the CUF does not exceed 1.0.

Environmental fatigue analyses have been prepared for the limiting locations within the Unit 1 and Unit 2 reactor pressure vessels and for ASME Class 1 piping systems. In some cases, reduced numbers of cycles were analyzed, based on 60-year projections that justify the reduced numbers of cycles. The Fatigue Monitoring program will be enhanced by incorporating the most limiting numbers of cycles for each transient type used in the environmental fatigue analyses as administrative cycle limits. If an administrative cycle limit is approached, corrective actions are triggered, which may include revision of the affected environmental fatigue calculations and an expansion of the sample of locations evaluated for environmental fatigue, if warranted.

The Fatigue Monitoring aging management program will be enhanced to:

1. Impose administrative transient cycle limits corresponding to the limiting numbers of cycles used in the environmental fatigue calculations.
2. Evaluate the impact of the reactor coolant environment on Class 1 components including valves and pumps if they are more limiting than those considered in NUREG/CR-6260.

These enhancements will be implemented prior to the period of extended operation.

A.3.1.2 Concrete Containment Tendon Prestress

The Concrete Containment Tendon Prestress aging management program is an existing condition monitoring program that is part of the containment inservice inspection program that is based on ASME Section XI, Subsection IWL criteria, as supplemented by the requirements of 10 CFR 50.55a(b)(2)(viii). The program monitors and manages the loss of tendon prestress in the concrete containment prestressing system for the period of extended operation. The prestressing tendons are used to impart compressive forces in the prestressed concrete containments to resist the internal pressure inside the containment that would be generated in the event of a LOCA. The prestressing forces generated by the tendons diminish over time due to losses in prestressing forces in the tendons and in the surrounding concrete. The regression and predicted lower limit analyses have been extrapolated through the end of the period of extended operation and the trend lines for each tendon group (vertical or horizontal (hoop) tendon types) have been shown to remain above the predicted lower limit and minimum required values for each tendon group. The program ensures that, during each inspection, the trend lines of the measured prestressing forces show that they meet the requirements of 10 CFR 50.55a(b)(2)(viii)(B). Measured forces and trend lines are compared to predicted lower limits, and minimum required values and corrective actions are taken if unacceptable results or trends are identified. The program also incorporates related plant-specific and industry operating experience.

The Concrete Containment Tendon Prestress aging management program will be enhanced as follows:

1. For each surveillance interval, trending lines will be projected through the period of extended operation as part of the regression analysis and compared to the predicted lower limit and minimum required values for each tendon group.

This enhancement will be implemented prior to the period of extended operation.

A.3.1.3 Environmental Qualification (EQ) of Electric Components

The Environmental Qualification (EQ) of Electric Components is an existing preventive program that manages the aging of electrical equipment within the scope of 10 CFR 50.49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants." The program establishes, demonstrates, and documents the level of qualification, qualified configurations, maintenance, surveillance and replacements necessary to meet 10 CFR 50.49. A qualified life is determined for equipment within the scope of the program and appropriate actions such as replacement or refurbishment are taken prior to or at the end of the qualified life of the equipment so that the aging limit is not exceeded. The various aging effects addressed by this program are adequately managed so that the intended functions of components within the scope of 10 CFR 50.49 are maintained consistent with the current licensing basis during the period of extended operation.

A.4 Time-Limited Aging Analyses

A.4.1 Identification and Evaluation of Time-Limited Aging Analyses

As part of the application for a renewed license, 10 CFR 54.21(c) requires that an evaluation of Time-Limited Aging Analyses (TLAAs) for the period of extended operation be provided. The TLAAs identified and evaluated to meet these requirements are described below.

10 CFR 54.21(c)(2) also requires that the application for a renewed license include a list of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based upon TLAAs as defined in 10 CFR 54.3. It also requires an evaluation that justifies the continuation of these exemptions for the period of extended operation. No exemptions were identified that are based upon a TLAA. Therefore, no further evaluation is required.

A.4.2 Reactor Vessel and Internals Neutron Embrittlement Analyses

10 CFR 50.60 requires that all light-water reactors meet the fracture toughness, P-T limits, and material surveillance program requirements for the reactor coolant pressure boundary as set forth in 10 CFR 50 Appendices G and H. The current reactor pressure vessel embrittlement calculations for LSCS that evaluate reduction of fracture toughness of the Unit 1 and Unit 2 reactor pressure vessel beltline materials for 40 years are based upon a predicted end-of-license fluence applicable for 32 Effective Full Power Years (EFPY). These analyses were identified as TLAAs as defined in 10 CFR 54.21(c) and were re-evaluated for the increased neutron fluence associated with 60 years of operation as described in the subsections below.

This section also includes evaluations of the increased neutron fluence on reactor internal components, including potential loss of preload for the core plate rim hold-down bolts and loss of preload for repair clamps that have been installed on select jet pumps.

A.4.2.1 Neutron Fluence Analyses

High energy (>1 MeV) neutron fluence was projected for 60 years, or 54 Effective Full Power Years (EFPY), for the RPV beltline welds and shells using the Radiation Analysis Model Application (RAMA) Fluence Methodology. Use of this model was performed in accordance with NRC Regulatory Guide 1.190. The 54 EFPY fluence projections are used in the evaluations of the neutron embrittlement TLAAs.

The 54 EFPY fluence values have been projected for reactor vessel beltline materials, which include the reactor vessel plate materials, welds, and nozzle forgings that will be exposed to 1.0 E+17 neutrons/cm^2 or more during 60 years of operation. Fluence projections have also been determined for specific reactor vessel internal components, both to evaluate fluence-based TLAAs and to determine when specified fluence threshold values may be exceeded that are used to invoke specific aging management requirements for these components, such as inspections.

A.4.2.2 Upper-Shelf Energy Analyses

10 CFR 50, Appendix G, Paragraph IV.A.1.a, requires that the reactor vessel beltline materials must maintain Charpy upper-shelf energy (USE) throughout the life of the vessel of no less than 50 ft-lb, unless it is demonstrated in a manner approved by the Director, Office of Nuclear Regulation, that lower values of Charpy upper-shelf energy will provide margins of safety against fracture equivalent to those required by Appendix G of Section XI of the ASME Code.

USE values were computed for all LSCS reactor vessel ferritic materials within the beltline that will be exposed to over 1.0 E+17 n/cm^2 by the end of the period of extended operation (54 EFPY). The 54 EFPY USE values for the beltline materials were determined using methods consistent with Regulatory Guide 1.99, Revision 2.

The 54 EFPY USE values for LSCS beltline materials remain within the limits of 10 CFR 50, Appendix G requirements by having USE values of at least 50 ft-lb. Therefore, the analyses are projected through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.4.2.3 Adjusted Reference Temperature Analyses

The adjusted reference temperature (ART) of the limiting beltline material is used to adjust the beltline P-T limits to account for irradiation effects. The initial nil-ductility reference temperature, RT_{NDT}, is the temperature at which a un-irradiated ferritic steel changes in fracture characteristics from ductile to brittle behavior. RT_{NDT} is evaluated according to the procedures in the ASME Code, Section III. Neutron embrittlement increases the RT_{NDT} beyond its initial value.

10 CFR 50, Appendix G defines the fracture toughness requirements for the life of the vessel. The shift in the initial RT_{NDT} (ΔRT_{NDT}) is evaluated as the difference in the 30 ft-lb index temperatures from the average Charpy curves measured before and after irradiation. This increase (ΔRT_{NDT}) means that higher temperatures are required for the material to continue to act in a ductile manner. The ART is defined as Initial RT_{NDT} + ΔRT_{NDT} + Margin. The Margin term is defined in Regulatory Guide 1.99, Revision 2.

54 EFPY ART values were computed for LSCS beltline materials in accordance with Regulatory Guide 1.99, Revision 2. The 54 EFPY ART values of the limiting beltline materials for each unit remain below 200 degrees F, which is the RT_{NDT} limit.

The adjusted reference temperature analyses have been projected through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.4.2.4 Pressure – Temperature Limits

10 CFR 50, Appendix G requires that the reactor pressure vessel be maintained within established Pressure-Temperature (P-T) limits, particularly during heatup and cooldown operations. These limits specify the minimum allowable temperature as a function of reactor pressure. As the reactor pressure vessel is exposed to increased neutron irradiation, its fracture toughness is reduced. The P-T limits must be periodically adjusted to account for the anticipated reactor vessel fluence.

The current P-T limits are based upon 32 EFPY fluence projections, consistent with the nominal amount of power to be generated over 40 years of plant operation. The P-T limits satisfy the criteria of 10 CFR 54.3(a) and have been identified as TLAAs.

In accordance with NUREG-1800, Revision 2, Section 4.2.2.1.3, the P-T limits for the period of extended operation need not be submitted as part of the LRA since the P-T limits need to be updated through the 10 CFR 50.90 licensing process when necessary. It further states that for those plants that have approved pressure-temperature limit reports (PTLRs) the P-T limits for the period of extended operation will be updated at the appropriate time through the plant's administrative section of the TS and the plant's PTLR process. In either case, the 10 CFR 50.90 or the PTLR processes, whichever constitutes the current licensing basis at the time, will be used to ensure that the P-T limits for the period of extended operation are updated prior to expiration of the 32 EFPY P-T limit curves.

A.4.2.5 Axial Weld Failure Probability Assessment Analyses

The BWRVIP recommendations for inspection of reactor pressure vessel shell welds in BWRVIP-05 include examination of 100 percent of the axial welds and inspection of the circumferential welds only at the intersections of these welds with the axial welds. BWRVIP-05 contains generic analyses supporting a conclusion in the NRC Final Safety Evaluation Report (FSER) that the generic-plant axial weld failure rate is orders of magnitude greater than the 40-year end-of-life circumferential weld failure probability and used this analysis to justify relief from inspection of the circumferential welds. The failure frequency is dependent upon given assumptions of flaw density, distribution, and location. Since the axial weld failure probability assessment is based on 32 EFPY fluence values associated with 40 years of operation, it has been identified as a TLAA requiring evaluation for the period of extended operation.

The LSCS axial weld failure probability has been projected for the period of extended operation. In order to evaluate the axial weld failure probability assessment for 60 years, 54 EFPY fluence values were derived for the limiting axial weld. Using the 54 EFPY fluence values, the LSCS Mean RT_{NDT} values were determined for each unit and compared to the NRC analytical results for 64 EFPY provided in the FSER to BWRVIP-05. Although a conditional failure probability has not been calculated for the LSCS units, the LSCS Mean RT_{NDT} values for the period of extended operation are significantly less than the NRC

RT_{NDT} value used in determining the conditional failure probability. Therefore, the NRC conditional failure probability is bounding for LSCS Unit 1 and Unit 2, consistent with the requirements defined in GL 98-05. These analyses have been projected through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.4.2.6 Circumferential Weld Failure Probability Assessment Analyses

ASME Section XI governs the inspection of the reactor pressure vessel circumferential welds, as implemented by the LSCS Inservice Inspection Program. LSCS has received relief from examination of circumferential welds. The relief from inspection is based on assessment of the probability of failure of the limiting circumferential weld. This assessment is based on 32 EFPY fluence values associated with 40 years of operation and has therefore been identified as a TLAA requiring evaluation for the period of extended operation.

In order to perform the LSCS circumferential weld failure probability assessment for 60 years, 54 EFPY fluence values were projected for the limiting circumferential weld for each reactor vessel. Using the 54 EFPY fluence values, the LSCS Mean RT_{NDT} values were projected for each unit and compared to the NRC analytical results for 64 EFPY provided in the FSER to BWRVIP-05. Although the conditional failure probability has not been calculated for the LSCS units, the LSCS Mean RT_{NDT} values for the period of extended operation are significantly less than the NRC RT_{NDT} value used in determining the conditional failure probability. Therefore, the NRC conditional failure probability is bounding for LSCS Unit 1 and Unit 2, consistent with the requirements defined in GL 98-05.

Reapplication for relief from circumferential weld examination will be made under 10 CFR 50.55a(a)(3) in time for NRC review and approval prior to the period of extended operation. The plant-specific information described above demonstrates that at the end of the period of extended operation, the circumferential beltline weld materials meet the limiting conditional failure probability for circumferential welds specified in the SER of BWRVIP-05. These analyses will be managed in accordance with 10 CFR 54.21(c)(1)(iii) by requesting relief from circumferential weld inspection using the 10 CFR 50.55a process.

A.4.2.7 Reactor Pressure Vessel Reflood Thermal Shock Analyses

A generic fracture mechanics evaluation was performed to evaluate the effects of a postulated loss of coolant accident (LOCA) on the structural integrity of a BWR-6 reactor pressure vessel. The rupture of a main steam line was determined to bound all other LOCA events with respect to this evaluation. Several emergency core cooling systems are activated at different times after the LOCA and the vessel is flooded with cooling water. The vessel depressurization and the subsequent injection of cold water to reflood the reactor vessel produce a rapid reduction in temperature and high thermal stresses in the vessel. The analysis concluded that the reactor pressure vessel has a considerable margin to failure by brittle fracture even in the presence of postulated pre-existing flaws. This generic analysis envelopes LSCS and is based on BWR vessel material properties and cumulative fluence assumed for 40 years of operation. Therefore, this analysis has been identified as a TLAA requiring evaluation for the period of extended operation.

An updated 60-year fracture mechanics evaluation was performed for the reflood thermal shock event to evaluate the component with the limiting material properties from the LSCS Unit 1 and Unit 2 RPV beltline plates, axial welds, and circumferential welds, which bounds the remainder. The analysis also evaluated the limiting N6 RHR/LPCI nozzle. The analysis determined that during the period of extended operation, each RPV has sufficient toughness margin to prevent unacceptable flaw propagation due to thermal shock during reflooding after LOCA events.

The reactor pressure vessel reflood thermal shock analysis has been projected through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.4.2.8 RPV Core Plate Rim Hold-Down Bolt Loss of Preload Analysis

The RPV core plate is attached to the core support structure by stainless steel hold-down bolts that are preloaded during initial installation. These bolts are subject to stress relaxation (loss of preload) due to irradiation effects. An analysis was performed concluding that a reduction in preload as high as 19 percent over the 40-year life of the bolts is acceptable to meet design requirements. A subsequent re-evaluation determined that this maximum relaxation value of 19 percent is applicable to an average fluence value of 8.0 E+19 n/cm^2 over the entire length of the bolt located at the azimuthal location with peak fluence. These analyses were identified as TLAAs.

In order to determine if these analyses will remain valid for 60 years, RAMA fluence projections were prepared for LSCS for 54 EFPY for the core plate rim bolt located at the azimuthal location with peak fluence. In order to determine the average fluence value along the length of the bolt, fluence projections were made at 30 discrete points along the length of the bolt at their centerline. These results were integrated and divided by the length of the bolt, resulting in an average fluence value of 3.60 E+19 n/cm^2 for Unit 1, and 3.85 E+19 n/cm^2 for Unit 2. This is well below the average value of 8.0 E+19 n/cm^2 previously evaluated. Therefore, the analysis remains valid through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.2.9 Jet Pump Riser Brace Clamp Loss of Preload Analysis

Jet pump riser brace repair clamps have been installed on two jet pump risers inside the Unit 1 RPV to structurally replace the riser brace yoke-to-riser welds (RS-8 and RS-9) as a repair for crack indications in the welds. The structural evaluation for the clamp assumed a 46 percent loss of preload during 40 years of operation due to irradiation effects. The evaluated 46 percent load relaxation was based on an end-of-life fluence value of 3.2 E+20 n/cm^{2,}

assuming 40 years of operation from the time of clamp installation. This analysis was identified as a TLAA.

The 60-year neutron fluence at the riser brace clamps was projected to be 2.0 E+20 n/cm^2 at 54 EFPY, which is less than the 3.2 E+20 n/cm^2 fluence value assumed in determining the acceptable load relaxation in the design analysis for the clamp. Therefore, the design analysis remains valid through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.2.10 Jet Pump Slip Joint Repair Clamp Loss of Preload Analysis

Jet pump slip joint repair clamps have been designed and installed at LSCS Unit 1 to minimize vibration and wear of the jet pump assemblies. The design analysis for the clamp determined that loss of preload would result from neutron fluence during the design life of the clamps. The loss of preload due to fluence was evaluated to the end of the 40-year license period. This analysis was identified as a TLAA.

The neutron fluence at the jet pump clamps was projected to be 1.27 E+20 n/cm^2 from the time of the first clamp installation in 2004 through the end of the period of extended operation. The limiting neutron fluence to maintain acceptable clamp preload is 1.17 E+20 n/cm^2. Since the fluence is predicted to exceed the analyzed value prior to the end of the period of extended operation, the analysis must be updated or other corrective actions must be taken prior to exceeding the analyzed fluence value, potentially including repair or replacement of the clamps. License renewal commitment 47 will be utilized to manage this TLAA through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

A.4.3 Metal Fatigue Analyses

Metal fatigue was considered explicitly in the design process for pressure boundary components designed in accordance with ASME Section III, Class A or Class 1 requirements. Metal fatigue was evaluated implicitly for components designed in accordance with ASME Section III, Class 2 or 3 requirements or ANSI B31.1 requirements. Each of these fatigue analyses and evaluations are considered to be Time-Limited Aging Analyses requiring evaluation for the period of extended operation in accordance with 10 CFR 54.21(c) as described below.

A.4.3.1 ASME Section III, Class 1 Fatigue Analyses

The LSCS reactor pressure vessel and reactor coolant pressure boundary piping and components were designed in accordance with the ASME Code Section III, Class 1 design requirements. Fatigue analyses and fatigue exemptions were prepared for these components to determine the effects of transients that result in cyclic loadings caused by changes in system temperature and pressure and for seismic loading cycles, as well as for hydrodynamic suppression pool loadings resulting from LOCA events. These Class 1 fatigue analyses are included in stress reports that evaluated an explicit number and type of transients to envelope the number of occurrences projected during the 40-year design life of the plant. Each analysis was required to demonstrate that the cumulative usage factor (CUF) for the component will not exceed the design limit of 1.0 when the component is exposed to all of the postulated transients. The Class 1 valve analyses were required to demonstrate that the valves can be operated for a minimum of 2,000 cycles and that the fatigue usage factor for step changes in fluid temperature does not exceed a limit of 1.0. Each of these stress reports include fatigue analyses and fatigue exemptions, where applicable, that have been identified as TLAAs since they are based upon a set of 40-year design transients, which are the CLB fatigue design cycles. When used in Class 1 fatigue analyses, these design cycles become CLB fatigue design cycle limits that must not be exceeded.

Each of the Class 1 fatigue analyses and fatigue exemptions was evaluated for 60 years by determining if the numbers of cycles assumed in the 40-year analysis will remain bounding of the numbers of cycles projected for the component through the end of the period of extended operation. These 60-year projections were based upon cumulative cycles to-date plus future cycles which were based upon past occurrences. Nearly all of the 60-year projections show that the CLB fatigue design cycle limits will not be reached by the end of the period of extended operation. However, for Unit 1, the 60-year projections for Startup and Shutdown transients slightly exceed the design cycle limits for the reactor vessel, but are less than the Class 1 piping CLB fatigue design cycle limits. The Fatigue Monitoring program is credited for managing these fatigue TLAAs in accordance with 10 CFR 54.21(c)(1)(iii), and the program includes requirements that trigger corrective action prior to exceeding the transient limits to ensure the component cumulative usage factor (CUF) is not permitted to exceed the design limit of 1.0 for these components. Corrective action may include repair or replacement of affected components or reanalysis of affected Class 1 components for an increased number of cycles.

The effects of aging on the intended functions of components analyzed in accordance with ASME Section III, Class 1 requirements will be adequately managed by the Fatigue Monitoring (A.3.1.1) program through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

A.4.3.2 ASME Section III, Class 2 and 3 and ANSI B31.1 Allowable Stress Analyses

Piping designed in accordance with ASME Section III, Class 2 or 3, or ANSI B31.1 Piping Code design rules is not required to have an explicit analysis of cumulative fatigue usage, but cyclic loading is considered in the design process. If the numbers of anticipated thermal cycles exceed specified limits, these codes require the application of a stress range reduction factor to the allowable stress to prevent damage from cyclic loading. This is considered to be an implicit fatigue analysis since it is based upon the anticipated number of cycles for the life of the component.

These codes first require the overall number of thermal and pressure cycles expected during the 40-year lifetime of these components to be determined. A stress range reduction factor is then determined for that number of cycles using the applicable design code. If the total number of cycles is 7,000 or less, the stress range reduction factor of 1.0 is applied, which would not reduce the allowable stress values. For higher numbers of cycles, the stress range reduction factor limits the allowable stresses that can be applied to the piping.

Class 2 and 3 and ANSI B31.1 piping systems that are extended from Class 1 systems are affected by the same operational transients that result in thermal cycles for the attached Class 1 piping. These transient cycles are monitored by the Fatigue Monitoring (A.3.1.1) program. The 60-year cycle projections for these transients demonstrate that the total number of thermal cycles for these piping systems will not exceed 10 percent of the 7,000 cycle threshold that would result in a reduction in the stress range reduction factor. Therefore, these TLAAs have been demonstrated to remain valid through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

For the remaining Class 2 and 3 and ANSI B31.1 piping systems that are affected by thermal transients that are different than those monitored for Class 1 systems, an operational review was performed. This includes portions of the Reactor Core Isolation Cooling, Fire Protection, and Diesel Generator and Auxiliaries Systems. The review concluded that the total number of thermal cycles for these systems, projected through the period of extended operation, will not exceed 20 percent of the 7,000 cycle threshold. Therefore, the stress range reduction factors originally selected for the Class 2 and 3 and ANSI B31.1 piping systems remain applicable and these TLAAs have been demonstrated to remain valid through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.3.3 Environmental Fatigue Analyses for RPV and Class 1 Piping

NUREG-1800, Revision 2 provides a recommendation for evaluating the effects of the reactor water environment on the fatigue life of ASME Section III Class 1 components that contact reactor coolant. One method to satisfy this recommendation is to assess the impact of the reactor coolant environment on a sample of critical components as described in NUREG/CR-6260. Additional component locations are evaluated if they are considered to be more limiting than those considered in NUREG/CR-6260.

Environmental fatigue calculations were performed for component locations listed in NUREG/CR-6260 for the newer-vintage BWR. In order to ensure that any other locations that may not be bounded by the NUREG/CR-6260 locations were evaluated, environmental fatigue calculations were performed for each RPV component location that normally contacts reactor coolant and has a reported cumulative usage factor (CUF) in the RPV stress report and for the limiting wetted surface location within each ASME Class 1 system (or group of systems that are affected by the same transients). These environmental fatigue calculations were performed for the limiting wetted location for each material type that contacts reactor coolant. The Fatigue Monitoring program will be enhanced to evaluate the impact of the reactor coolant environment on Class 1 components including valves and pumps if they are more limiting than those considered in NUREG/CR-6260.

NUREG-1800, Revision 2, specifies options for evaluating environmental effects. The formulae specified in the option listed below for each material were used in evaluating the LSCS components for environmental effects:

Carbon and Low Alloy Steels

- Those provided in Appendix A of NUREG/CR-6909, using the fatigue design curve for carbon and low alloy steel provided in NUREG/CR-6909 (Figure A.1 and A.2, respectively, and Table A.1).

Austenitic Stainless Steels

- The formula provided in NUREG/CR-6909, using the fatigue design curve for austenitic stainless steel provided in NUREG/CR-6909 (Figure A.3 and Table A.2).

Nickel Alloys

- The formula provided in NUREG/CR-6909, using the fatigue design curve for austenitic stainless steel provided in NUREG/CR-6909 (Figure A.3 and Table A.2).

Additional refinements were performed as appropriate and several locations required a reduction in the numbers of postulated cycles. The resulting environmentally-adjusted CUF values (CUF_{en}) were demonstrated not to exceed the design Code limit of 1.0.

These environmental fatigue analyses will be managed by the Fatigue Monitoring (A.3.1.1) program in the same manner as the ASME Section III, Class 1 fatigue analyses. The program ensures that the cumulative number of occurrences of each transient type is maintained below the number of cycles used in the most limiting fatigue analysis.

If a cycle limit is approached, corrective actions are triggered to prevent exceeding the limit. The fatigue analyses may be revised to account for increased numbers of cycles or transient severity such that the CUF value does not exceed the Code design limit of 1.0, including environmental effects where applicable.

Prior to the period of extended operation, the Fatigue Monitoring program will be enhanced to impose administrative transient cycle limits corresponding to the limiting numbers of cycles used in the environmental fatigue calculations.

The effects of aging on the intended functions will be adequately managed by the Fatigue Monitoring (A.3.1.1) program through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

A.4.3.4 Reactor Vessel Internals Fatigue Analyses

The RPV and RPV internal components were included in the NSSS New Loads Design Adequacy Evaluations performed for each unit to address the effects of plant-specific seismic loadings and suppression pool hydrodynamic structural loadings on NSSS equipment. These evaluations included fatigue analyses of components if the applied loadings exceed certain thresholds. These fatigue analyses and fatigue exemptions have been identified as TLAAs that require evaluation for the period of extended operation.

The fatigue analyses and fatigue exemptions performed for the reactor internals components are based upon the same set of design transients as those used in the fatigue analyses for the reactor pressure vessel. Nearly all of the 60-year projections show that the design cycle limits will not be reached by the end of the period of extended operation. However, for Unit 1, the 60-year projections for Startup and Shutdown transients slightly exceed the design cycle limits for the reactor vessel internals components. To ensure that these fatigue analyses and fatigue exemptions will remain valid, the Fatigue Monitoring (A.3.1.1) program will be used to manage fatigue of these components through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

A.4.3.5 High-Energy Line Break (HELB) Analyses Based Upon Fatigue

High-Energy Line Break (HELB) analyses for LSCS used the CUF values from the ASME Class 1 fatigue analyses as input in determining intermediate break locations. Since the Class 1 fatigue analyses that provided the CUF values are based upon 40-year transient assumptions, the HELB analyses have been identified as TLAAs.

Transient cycle projections for Class 1 piping were performed that determined the 40-year transient cycle limits for piping are not expected to be exceeded in 60 years. The Fatigue Monitoring (A.3.1.1) program is credited with ensuring that the numbers of actual transient cycles do not exceed the numbers of transient cycles analyzed in the Class 1 piping fatigue analyses that provided the CUF values less than 0.1 used in the HELB analyses. Therefore, these fatigue analyses will be managed through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

A.4.3.6 Main Steam Relief Valve Discharge Piping Fatigue Analysis

The Main Steam Relief Valve (MSRV) discharge lines have been evaluated for cumulative fatigue usage based on the number of transient cycles predicted to occur in 40 years. Therefore, these fatigue analyses have been identified as TLAAs.

The MSRV discharge lines were analyzed for dynamic and hydrodynamic loads from normal and upset conditions and loss of coolant accident (LOCA) events that result in MSRV actuations. They were analyzed for 2,800 SRV actuations and a resulting 8,400 acoustic cycles.

The 60-year transient projections show that the total number of MSRV actuations will not exceed the number analyzed for 40 years in either unit. No OBE or SSE event has occurred to-date and neither event has a 60-year projection that exceeds the design limit of one event. Therefore, the Main Steam Relief Valve discharge piping fatigue analysis remains valid through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.4 Environmental Qualification (EQ) of Electric Components

A.4.4.1 Environmental Qualification (EQ) of Electric Components

Thermal, radiation, and cyclical aging analyses of plant electrical and I&C components, developed to meet 10 CFR 50.49 requirements, have been identified as time-limited aging analyses (TLAAs) for LSCS. The NRC has established nuclear station environmental qualification (EQ) requirements in 10 CFR 50.49 and 10 CFR 50, Appendix A, Criterion 4. 10 CFR 50.49 specifically requires that an EQ program be established to demonstrate that certain electrical components located in harsh plant environments are qualified to perform their safety function in those harsh environments after the effects of inservice aging. Harsh environments are defined as those areas of the plant that could be subject to the harsh environmental effects of a loss of coolant accident (LOCA), high-energy line break (HELB), or post-LOCA radiation. 10 CFR 50.49 requires that the effects of significant aging mechanisms be addressed as part of environmental qualification.

The Environmental Qualification (EQ) of Electric Components (A.3.1.3) program will manage the effects of aging effects for the components associated with the environmental qualification through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). This program implements the requirements of 10 CFR 50.49 (as further defined and clarified by NUREG-0588, and RG 1.89. Reanalysis of component aging evaluations is performed on a routine basis to extend the qualifications of components as part of the 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).

Under the 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.

A.4.5 Concrete Containment Tendon Prestress Analyses

A.4.5.1 Concrete Containment Tendon Prestress Analyses

The containment tendon prestressing forces were calculated during the original design considering the magnitude of the tendon relaxation and concrete creep and shrinkage over the 40-year life of the plant. The predicted lower limit force values and regression analyses, utilizing actual measured tendon forces are used to evaluate the acceptability of the containment structure to perform its intended function over the current 40-year life of the plant, and therefore have been identified as TLAAs requiring evaluation for the period of extended operation.

The ASME Section XI, Subsection IWL (A.2.1.30) program performs periodic surveillances of individual tendon prestressing values. Predicted lower limit (PLL) force values are calculated for each tendon prior to the surveillances to estimate the magnitude of the tendon relaxation and concrete creep and shrinkage for the given surveillance year. The prestressing forces are measured and plotted, and trend lines are developed to ensure the tendon group (vertical and horizontal tendon types) prestressing values remain above the respective minimum required values (MRVs) until the next scheduled surveillance and for the 40-year license period.

The Concrete Containment Tendon Prestress (A.3.1.2) program will monitor and manage the TLAAs and the associated loss of tendon prestressing forces through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). The regression analyses are periodically updated following successive surveillances to ensure that estimated values remain above the MRVs until the next scheduled surveillance and for the 60-year life of the plant. Individual measured tendon prestressing forces will be compared to predicted PLL values and trend lines developed for the period of extended operation.

A.4.6 Primary Containment Fatigue Analyses

A.4.6.1 Primary Containment Liner and Penetrations Fatigue Analyses

The LSCS primary containment liner, penetrations, and Class MC components were designed and analyzed for the transient cycles predicted for 40 years. These analyses have been identified as TLAAs.

The 60-year transient cycle projections for Unit 2 demonstrate that the transient cycle limits used in the containment analyses will not be exceeded in 60 years. This includes normal, upset, and emergency events, and design basis accidents. The 60-year transient cycle projections for Unit 1 show that the transient cycle limits for most events will not be exceeded in 60 years, but the numbers of startup and shutdown cycles are projected to slightly exceed their design limits. For both units, the Fatigue Monitoring program will be used to monitor and track the analyzed transients and to trigger corrective action prior to exceeding the transient limits to ensure the component cumulative usage factor (CUF) is not permitted to exceed the design limit of 1.0 for these components. The effects of aging on the intended functions of components analyzed in accordance with ASME Section III, Class 1 requirements will be managed by the Fatigue Monitoring (A.3.1.1) program through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

A.4.6.2 Primary Containment Refueling Bellows Fatigue Analysis

The refueling bellows and supports were analyzed for cumulative fatigue usage based on the number of transient cycles predicted to occur in 40 years, but this conservatively included 200 startup and shutdown cycles. Therefore, these fatigue analyses have been identified as TLAAs that require evaluation for the period of extended operation.

Transient cycle projections were performed that determined the 40-year transient cycle limits will not be exceeded in 60 years based upon the average rate of occurrences to-date. The analyses remain valid through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.6.3 Primary Containment Downcomer Vents Fatigue Analysis

The downcomer vents and bracing inside the suppression chamber were analyzed for cumulative fatigue usage based on the number of transient cycles predicted to occur in 40 years. Therefore, this fatigue analysis has been identified as a TLAA.

The downcomers and bracing were analyzed for seismic loads and thermal and cyclic loads resulting from Main Steam Relief Valve (MSRV) openings and the discharge of steam from the drywell to the suppression pool during a loss of coolant accident (LOCA) event. The 60-year transient projections show that the total number of MSRV actuations will not exceed the number analyzed for 40 years in either unit. No OBE or SSE event has occurred to-date and neither event has a 60-year projection that exceeds the design limit of one event. Therefore, the primary containment downcomer vent fatigue analysis has been demonstrated to remain valid through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.7 Other Plant–Specific Analyses

A.4.7.1 Reactor Building Crane Cyclic Loading Analysis

The LSCS reactor building crane is designed to meet the fatigue requirements of the NOG-1-2004 and Crane Manufacturers Association of America (CMAA) Specification 70 for a Class A, Standby or Infrequent Service Crane, as discussed in UFSAR Section 9.1.4.2.3, "Reactor Building Crane." For this crane, the CMAA design considerations allow for between 20,000 and 100,000 load cycles. 20,000 cycles is a conservative limitation on load cycles for this crane. This evaluation of cycles over the 40-year plant life has been identified as a TLAA that requires evaluation for the period of extended operation.

The evaluation of the reactor building crane cyclic loading TLAA included (1) reviewing the existing 40-year design basis to determine the number of load cycles considered in the design of the crane, (2) developing a 60-year projection for load cycles for the crane, and (3) comparing the 60-year projected number of cycles to the limiting value of 20,000 load cycles. The number of cycles projected for 60 years of operation is less than 20 percent of the limiting design value. Therefore, the reactor building crane cyclic loading analysis remains valid through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.7.2 Main Steam Line Flow Restrictors Erosion Analysis

A main steam line flow restrictor is welded into each of the four main steam lines between the main steam relief valves and the inboard main steam isolation valve (MSIV). The restrictor assemblies consist of a stainless steel venturi-type nozzle welded into the carbon steel main steam line piping. The restrictors are designed to limit steam flow prior to MSIV closure in the event of a main steam line break outside of primary containment.

The analysis of main steam line flow restrictor erosion is discussed in UFSAR Section 5.4.4. UFSAR Section 5.4.4 indicates that very slow erosion occurs with time and such slight enlargement has no safety significance. Since the erosion evaluation was based on 40 years of operation, erosion of the main steam line flow restrictor has been identified as a TLAA that requires evaluation for the period of extended operation.

Calculations indicate that even with erosion rates as high as 0.004 inches per year the increase in choked flow rate would be no more than five percent after 40 years of operation. The increase in choked flow rate is projected to be no more than 10 percent after 60 years. The LSCS analysis for radiation dose consequences resulting from a main steam line break outside containment projects a dose of less than one percent of the 10 CFR 100 limits. Therefore, sufficient margin exists to allow for the projected increase in steam flow resulting from erosion of the main steam line flow restrictor through the end of the period of extended operation.

The analysis has been projected through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.5 License Renewal Commitment List

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	Existing program is credited.	Ongoing	Section A.2.1.1
2	Water Chemistry	Existing program is credited.	Ongoing	Section A.2.1.2
3	Reactor Head Closure Stud Bolting	Existing program is credited.	Ongoing	Section A.2.1.3
4	BWR Vessel ID Attachment Welds	Existing program is credited.	Ongoing	Section A.2.1.4
5	BWR Feedwater Nozzle	Existing program is credited.	Ongoing	Section A.2.1.5
6	BWR Control Rod Drive Return Line Nozzle	Existing program is credited.	Ongoing	Section A.2.1.6
7	BWR Stress Corrosion Cracking	Existing program is credited.	Ongoing	Section A.2.1.7
8	BWR Penetrations	Existing program is credited.	Ongoing	Section A.2.1.8
9	BWR Vessel Internals	BWR Vessel Internals is an existing program that will be enhanced to: 1. Perform an assessment of the susceptibility of reactor vessel internal components fabricated from CASS to loss of fracture toughness due to thermal aging embrittlement. If material properties cannot be determined to perform the screening, they will be assumed susceptible to thermal aging for the purposes of determining program examination requirements. 2. Perform an assessment of the susceptibility of reactor vessel internal components fabricated from CASS to loss of fracture toughness due to neutron irradiation embrittlement. 3. Specify the required periodic inspection of CASS components determined to be susceptible to loss of fracture toughness due to thermal aging and neutron irradiation embrittlement. The initial inspections will be performed either prior to or within five years after entering the period of extended operation.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.9

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
10	Flow-Accelerated Corrosion	Existing program is credited.	Ongoing	Section A.2.1.10
11	Bolting Integrity	Bolting Integrity is an existing program that will be enhanced to: 1. Provide guidance to ensure proper specification of bolting material, lubricant and sealants, storage, and installation torque or tension to prevent or mitigate degradation and failure of closure bolting for pressure-retaining bolted joints. 2. Prohibit the use of lubricants containing molybdenum disulfide on pressure-retaining bolted joints. 3. Minimize the use of high strength bolting (actual measured yield strength equal to or greater than 150 ksi) for pressure-retaining bolted joints in portions of systems within the scope of the Bolting Integrity program. High strength bolting (regardless of code classification) will be monitored for cracking in accordance with ASME Section XI, Table IWB-2500-1, Examination Category B-G-1. 4. Perform visual inspection of submerged bolting for the emergency core cooling systems (ECCS) and reactor core isolation cooling (RCIC) system suction strainers in the suppression pool for loss of material and loss of preload during each ISI inspection interval. 5. Perform visual inspection of submerged bolting for the service water diver safety barriers and diesel fire pump suction screens for loss of material and loss of preload during maintenance activities. 6. Perform visual inspection of submerged bolting for the Lake Screen House travelling screens framework for loss of material and loss of preload each refueling interval.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.11

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
12	Open-Cycle Cooling Water System	Open-Cycle Cooling Water System is an existing program that will be enhanced to: 1. Perform a minimum of 10 microbiologically influenced corrosion (MIC) degradation inspections for aboveground piping in the Essential Cooling Water System every 24 months until the rate of MIC occurrences no longer meets the criteria for recurring internal corrosion. The selected inspection locations will be periodically reviewed to validate their relevance and usefulness and adjusted as appropriate. Evaluation of the inspection results will include; (1) a comparison to the nominal wall thickness or previous wall thickness measurements to determine rate of corrosion degradation; (2) a comparison to the design minimum allowable wall thickness to determine the acceptability of the component for continued use; and (3) a determination of re-inspection interval. A portion of these inspection locations will be selected with process conditions similar (e. g. flow, temperature) to those in buried portions of the piping to provide sufficient understanding of the condition of the buried piping. 2. Perform a minimum of 10 MIC degradation inspections for in scope aboveground piping in the Nonessential Cooling Water System every 24 months until the rate of MIC occurrences no longer meets the criteria for recurring internal corrosion. The selected inspection locations will be periodically reviewed to validate their relevance and usefulness and adjusted as appropriate. Evaluation of the inspection results will include (1) a comparison to the nominal wall thickness or previous wall thickness measurements to determine rate of corrosion degradation; (2) a comparison to the design minimum allowable wall thickness to determine the acceptability of the component for continued use; and (3) a determination of re-inspection interval. A portion of these inspection locations will be selected with process conditions similar (e. g. flow, temperature) to those in buried portions of the piping to provide sufficient understanding of the condition of the buried piping. 3. Select an inspection method that will provide indication of suitable wall thickness to perform inspections on a representative sample of buried piping to supplement the aboveground piping inspection locations. 4. Perform visual inspections of the interior surface of buried portions of the Essential Cooling Water System and Nonessential Cooling Water System whenever the piping internal surface is made accessible due to maintenance and repair activities.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.12

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
13	Closed Treated Water Systems	Closed Treated Water Systems is an existing program that will be enhanced to: 1. Perform condition monitoring, including periodic visual inspections and non-destructive examinations, to verify the effectiveness of water chemistry control to mitigate aging effects. A representative sample of piping and components will be selected based on likelihood of corrosion, stress corrosion cracking, or fouling, and inspected at an interval not to exceed once in 10 years during the period of extended operation. The selection of components to be inspected will focus on locations which are most susceptible to age-related degradation, where practical.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.13
14	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 is an existing program that will be enhanced to: 1. Provide additional guidance to include inspection of structural components, rails, and bolting for loss of material due to corrosion; rails for loss of material due to wear; and bolted connections for loss of preload.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.14
15	Compressed Air Monitoring	Compressed Air Monitoring is an existing program that will be enhanced to: 1. Inspect the internal surfaces of system filters, compressors, and after-coolers for signs of corrosion and corrosion products. 2. Perform analysis and trending of air quality monitoring results and visual inspection results. 3. Document deficiencies which are identified during visual inspections of the internal surfaces of system components in the corrective action program.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.15

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
16	Fire Protection	Fire Protection is an existing program that will be enhanced to: 1. Perform periodic visual inspection of combustible liquid spill retaining curbs. 2. Perform periodic visual inspection for identification of corrosion that may lead to loss of material on the external surfaces of the low pressure carbon dioxide fire suppression systems. 3. Provide additional inspection guidance to identify aging effects as follows: a. Fire barrier walls, ceilings, and floors degradation such as spalling, cracking, and loss of material for concrete. b. Elastomeric fire barrier material degradation such as loss of material, shrinkage, separation from walls and components, increased hardness and loss of strength. 4. Provide additional inspection guidance to identify degradation of fire barrier penetration seals for aging effects such as loss of material, cracking, increased hardness, shrinkage, and loss of strength.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.16
17	Fire Water System	Fire Water System is an existing program that will be enhanced to: 1. Perform volumetric examinations at five locations on the carbon steel aboveground fire water piping susceptible to microbiologically induced corrosion (MIC) every year to identify loss of material. Additional locations will be examined if these volumetric examinations or plant operating experience identify significant degradation. For through-wall leaks and material loss greater than 50 percent of nominal wall, four additional locations will be examined. Where the identified material loss is 30 percent to 50 percent of nominal wall thickness and the calculated remaining life is less than two years, two additional locations will be examined. 2. Perform visual inspections, for loss of material and flow obstructions, of the accessible header piping and sparger external surfaces for the deluge systems located within filter plenums on a once per refueling cycle frequency. The visual inspection will include verification that the piping and spargers are in their proper position and that there are no obstructions to the desired spray patterns.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.17

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		3. Perform internal visual inspections of sprinkler and deluge system piping to identify internal corrosion and obstructions to flow. Followup volumetric examinations will be performed if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval. The internal visual inspections will consist of the following: a. Wet pipe sprinkler systems – 50 percent of the wet pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2. b. Dry pipe sprinkler systems - Dry pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2. c. Deluge systems - Deluge systems in scope for license renewal, except for the charcoal filter deluge systems, will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2. i. The in scope charcoal filter deluge systems will have visual internal inspections performed on one of the 11 systems every five years. If degraded conditions are identified, the inspections will be expanded to include all 11 charcoal filter systems every five years. d. Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have additional tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect. i. These additional inspections, if required, will be performed in each five-year interval beginning five years prior to the period of extended operation.		

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		ii. This additional inspection consists of either a flow test or flush sufficient to detect potential flow blockage or a visual inspection of 100 percent of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect. iii. In addition, in each five-year interval of the period of extended operation, 20 percent of the length of piping segments that cannot be drained or piping segments that allow water to collect is subject to volumetric wall thickness inspections. 4. Perform obstruction evaluations when degraded conditions are identified by visual inspections, flow testing, or volumetric examinations. The obstruction evaluations will include an extent of condition determination, need for increased inspections, and followup examinations if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval. 5. Perform flow tests for hose stations at the hydraulically most limiting locations for each zone of the system on a five-year frequency to demonstrate the capability to provide the design pressure at required flow.		

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
18	Aboveground Metallic Tanks	Aboveground Metallic Tanks is an existing program that will be enhanced to: 1. Perform a visual inspection of the tank shell, roof, and bottom interior surfaces for signs of loss of material on one of the cycled condensate storage tanks within five years prior to the period of extended operation. This inspection shall include both wetted and non-wetted surfaces and may be either direct visual inspection from inside the tanks or volumetric examination from outside the tank. A volumetric examination from outside the tank will include 25 percent of the tank surface area. Should the one-time inspection identify degradation, periodic inspections with an inspection frequency based on the rate of degradation will be established for both tanks. 2. Perform a visual inspection of the exterior surfaces of both cycled condensate storage tanks for loss of material each refueling interval. 3. Perform a volumetric examination of the tank bottom for both cycled condensate storage tanks for signs of loss of material whenever the tanks are drained. At a minimum, an inspection shall be performed within 10 years prior to the period of extended operation and subsequent inspections shall be performed in each 10-year period during the period of extended operation. 4. Perform an inspection of the caulking at the perimeter of the cycled condensate storage tank bases for signs of degradation each refueling interval.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.18
19	Fuel Oil Chemistry	Fuel Oil Chemistry is an existing program that will be enhanced to: 1. Perform periodic (quarterly) sampling and analysis for water and sediment content, particulate concentration, and the levels of microbiological organisms for diesel fuel storage tanks 0DO01T, 1DO01T, and 2DO01T. 2. Perform periodic (quarterly) sampling and analysis for water and sediment content, particulate concentration, and the levels of microbiological organisms for HPCS diesel fuel storage tanks 1DO02T and 2DO02T. 3. Perform periodic (quarterly) sampling and analysis for water and sediment content and the levels of microbiological organisms for diesel generator day	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.19

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		tanks 0DO02T, 1DO05T, and 2DO05T. 4. Perform periodic (quarterly) sampling and analysis for water and sediment content and the levels of microbiological organisms for HPCS diesel day tanks 1DO04T and 2DO04T. 5. Perform periodic (quarterly) sampling and analysis for water and sediment content, particulate concentration, and the levels of microbiological organisms for diesel fire pump day tanks 0FP01TA and 0FP01TB. 6. Perform periodic internal inspections of diesel fire pump day tanks 0FP01TA and 0FP01TB at least once during the 10-year period prior to the period of extended operation, and at least once every 10 years during the period of extended operation. Each diesel fuel tank will be drained and cleaned, the internal surfaces visually inspected (if physically possible), and, if evidence of degradation is observed during inspections, or if visual inspection is not possible, these diesel fuel tanks will be volumetrically inspected. 7. Perform volumetric inspection of diesel fuel storage tanks 0DO01T, 1DO01T, and 2DO01T; HPCS diesel fuel storage tanks 1DO02T and 2DO02T; diesel generator day tanks 0DO02T, 1DO05T, and 2DO05T; and HPCS diesel day tanks 1DO04T and 2DO04T if evidence of degradation is observed during visual inspection, or if visual inspection is not possible. 8. Perform periodic (quarterly) trending of water and sediment content, particulate concentration, and the levels of microbiological organisms for all fuel oil tanks within the scope of the program.		
20	Reactor Vessel Surveillance	Existing program is credited.	Ongoing	Section A.2.1.20

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
21	One-Time Inspection	One-Time Inspection is a new condition monitoring program that will be used to verify the system-wide effectiveness of the Water Chemistry (A.2.1.2) program, Fuel Oil Chemistry (A.2.1.19) program, and Lubricating Oil Analysis (A.2.1.26) program which are designed to prevent or minimize aging to the extent that it will not cause a loss of intended function during the period of extended operation.	Program to be implemented prior to the period of extended operation. One-time inspections will be performed within the 10 years prior to the period of extended operation.	Section A.2.1.21
22	Selective Leaching	Selective Leaching is a new condition monitoring program that will include one-time inspections of a representative sample of susceptible components to determine if loss of material due to selective leaching is occurring.	Program to be implemented prior to the period of extended operation. One-time inspections will be performed within the five years prior to the period of extended operation	Section A.2.1.22
23	One-time Inspection of ASME Code Class 1 Small-Bore Piping	One-time Inspection of ASME Code Class 1 Small-Bore Piping is a new condition monitoring program that will manage the aging effect of cracking in ASME Code Class 1 small-bore piping that is less than nominal pipe size (NPS) 4-inches, and greater than or equal to NPS 1-inch.	Program to be implemented prior to the period of extended operation. One-time Inspections will be performed within the six years prior to the period of extended operation.	Section A.2.1.23
24	External Surfaces Monitoring of Mechanical Components	External Surfaces Monitoring of Mechanical Components is a new condition monitoring program that directs visual inspections of external surfaces of components be performed during system inspections and walkdowns.	Program to be implemented prior to the period of extended operation.	Section A.2.1.24

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
25	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Internal Surfaces in Miscellaneous Piping and Ducting Components is new condition monitoring program that will consist of inspections of the internal surfaces of metallic and elastomeric components such as piping, piping components and piping elements, ducting components, tanks, heat exchanger components, elastomers, and other components that are exposed to environments of condensation, diesel exhaust, and waste water.	Program to be implemented prior to the period of extended operation.	Section A.2.1.25
26	Lubricating Oil Analysis	Existing program is credited.	Ongoing	Section A.2.1.26
27	Monitoring of Neutron-Absorbing Materials Other than Boraflex	Monitoring of Neutron-Absorbing Materials Other than Boraflex is an existing program that will be enhanced to: 1. Maintain the test coupon exposure such that it is bounding for the neutron-absorbing material in all spent fuel racks, by relocating the coupon tree to a different spent fuel rack cell location each cycle and by surrounding the coupons with a greater number of freshly discharged fuel assemblies than that of any other cell location.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.27
28	Buried and Underground Piping	Buried and Underground Piping is an existing program that will be enhanced to: 1. Manage cracking for stainless steel piping, utilizing a method that has been demonstrated to be capable of detecting cracking, whenever coatings are removed and expose the base material. 2. Ensure all underground carbon steel Essential Cooling Water System and Nonessential Cooling Water System piping and components within the scope of license renewal are coated in accordance with Table 1 of NACE SP0169-2007. 3. Define acceptable coating conditions as coating exhibiting either no evidence of degradation, or, the type and extent of coating damage evaluated as insignificant by an individual possessing a NACE Coating Inspector Program Level 2 or 3 operator qualification, or by an individual who has attended the Electric Power Research Institute (EPRI) Comprehensive Coatings Course and completed the EPRI Buried Pipe Condition Assessment and Repair Training Computer Based Training Course. 4. Perform inspection quantities of buried piping within the scope of license	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.28

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		renewal in accordance with LR-ISG-2011-03, Element 4.b and Table 4a, during each 10-year period, beginning 10 years prior to the period of extended operation. The number of inspections of buried piping will be based upon the as-found results of cathodic protection system availability and effectiveness. 5. Perform direct visual inspections of underground Essential Cooling Water System and Nonessential Cooling Water System piping within the scope of license renewal during each 10-year period, beginning 10 years prior to the period of extended operation. 6. Double the inspection sample sizes within the affected piping categories if adverse indications are detected during inspection. If adverse indications are found in the expanded sample, an analysis will be conducted to determine the extent of condition and extent of cause. The size of the followup inspections will be determined based on the analysis. Timing of the additional inspections will be based on the severity of the identified degradation and the consequences of leakage. In all cases, the additional inspections will be performed within the same 10-year inspection interval in which the original adverse indication was identified. Expansion of sample size may be limited by the extent of piping subject to the observed degradation mechanism. 7. Use only the -850mV polarized potential criterion specified in NACE SP0169-2007 for acceptance criteria for steel piping and determination of cathodic protection system effectiveness in performing cathodic protection surveys. Alternatively, soil corrosion probes may also be used to demonstrate cathodic protection effectiveness during the annual surveys. An upper limit of -1200mV for pipe-to-soil potential measurements of coated pipes will also be established, so as to preclude potential damage to coatings. 8. Conduct an extent of condition evaluation if observed coating damage caused by non-conforming backfill has been evaluated as significant. The extent of condition evaluation will be conducted to ensure that the as-left condition of backfill in the vicinity of the observed damage will not lead to further degradation.		

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
29	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE is an existing program that will be enhanced to: 1. Provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting. 2. If leakage from the reactor cavity pool drain line welds exists, then perform ultrasonic thickness measurements on the Unit 2 drywell liner at 0 and 180 degrees for several feet below elevation 813. The inspections will begin in 2015 and a periodic inspection frequency will be established based on the inspection results.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.29
30	ASME Section XI, Subsection IWL	ASME Section XI, Subsection IWL is an existing program that will be enhanced to: 1. Explicitly require that areas of concrete deterioration and distress be recorded in accordance with the guidance provided in ACI 349.3R. 2. Include quantitative acceptance criteria, based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R, that will be used to augment the qualitative assessment of the Responsible Engineer.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.30

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
31	ASME Section XI, Subsection IWF	ASME Section XI, Subsection IWF is an existing program that will be enhanced to: 1. Provide guidance for proper specification of bolting material, storage, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting. Requirements for high strength bolts shall include the preventive actions for storage, lubricants, and stress corrosion cracking potential discussed in Section 2 of RCSC (Research Council on Structural Connections) publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts." Lubricants that contain molybdenum disulfide (MoS_2) shall not be applied to high strength bolts within the scope of license renewal. 2. Provide guidance, regarding the selection of supports to be inspected on subsequent inspections, when a support is repaired in accordance with the corrective action program. The enhanced guidance will ensure that the supports inspected on subsequent inspections are representative of the general population.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.31
32	10 CFR Part 50, Appendix J	Existing program is credited.	Ongoing	Section A.2.1.32
33	Masonry Walls	Masonry Walls is an existing program that will be enhanced to: 1. Provide guidance for inspection of masonry walls for separation and gaps between the supports for masonry walls. 2. Require that personnel performing inspections and evaluations meet the qualifications described in ACI 349.3R.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.33
34	Structures Monitoring	Structures Monitoring is an existing program that will be enhanced to: 1. Add the following components and commodities: a. Pipe, electrical, and equipment component support members b. Pipe whip restraints and jet impingement shields c. Panels, racks, cabinets, and other enclosures d. Sliding surfaces e. Sumps f. Electrical cable trays and conduits	Program to be enhanced prior to the period of extended operation.	Section A.2.1.34

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		g. Electrical duct banks h. Tube tracks i. Transmission tower (including takeoff towers) and foundation (including cycled condensate storage tank foundations) j. Penetration seals and sleeves k. Blowout panels l. Permanent drywell shielding m. Transformer foundation n. Bearing pads o. Compressible joints p. Hatches, plugs, handholes, and manholes q. Metal components (decking, vent stack, and miscellaneous steel) r. Building features – doors and seals, bird screens, louvers, windows, and siding s. Concrete curbs, and anchors 2. Provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting. 3. Revise storage requirements for high strength bolts to include recommendations of Research Council on Structural Connections (RCSC) Specification for Structural Joints Using High Strength Bolts, Section 2.0. 4. Require acceptance and evaluation of structural concrete using quantitative criteria based on Chapter 5 of ACI 349.3R. 5. Monitor raw water and ground water chemistry on a frequency not to exceed five years for pH, chlorides, and sulfates and verify that it remains non-aggressive, or evaluate results exceeding criteria to assess impact, if any, on below-grade concrete. 6. Monitor concrete for increase in porosity and permeability, inspection of accessible sliding surfaces for indication of significant loss of material due to wear or corrosion, debris, or dirt. 7. For in scope structures, examine representative samples of the exposed		

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		portions of the below grade concrete when excavated for any reason. 8. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R with respect to knowledge of inservice inspection of concrete and visual acuity requirements. 9. Clarify that loose bolts and nuts and cracked high strength bolts are not acceptable unless accepted by engineering evaluations.		
35	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants is an existing program that will be enhanced to: 1. Include monitoring of the following: a. Submerged Core Standby Cooling System Pond and Intake Flume (includes earthen walls, south flume concrete retaining wall, and north flume sheet piling retaining wall) b. Core Standby Cooling System outfall structure c. Bar racks and miscellaneous steel d. Shad net anchors e. Lake Screen House (includes service water tunnel) 2. Monitor raw water and ground water chemistry at least once every five years for pH, chlorides, and sulfates and verify that it remains non-aggressive, or evaluate results exceeding criteria to assess impact, if any, on buried or submerged concrete. 3. Provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting, and preventative actions for storage of materials to prevent stress corrosion cracking. 4. Require acceptance and evaluation of structural concrete using quantitative criteria based on Chapter 5 of ACI 349.3R. 5. Require inspection of accessible in scope portions of the Cooling Lake and Lake Screen House immediately following the occurrence of significant	Program to be enhanced prior to the period of extended operation.	Section A.2.1.35

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		natural phenomena, which includes intense local rainfalls and large floods. 6. Require: a. The evaluation of the acceptability of inaccessible areas when conditions exist in the accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas. b. Examination of the exposed portions of the below grade concrete when excavated for any reason.		
36	Protective Coating Monitoring and Maintenance Program	Existing program is credited.	Ongoing.	Section A.2.1.36
37	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is a new program that will be used to manage reduced insulation resistance of the insulation material for non-EQ cables and connections. Accessible cables and connections located in adverse localized environments will be visually inspected at least once every 10 years for indications of reduced insulation resistance, such as embrittlement, discoloration, cracking, melting, swelling, or surface contamination.	Program and initial inspections to be implemented prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.37
38	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits is a new program that will be used to manage the effects of reduced insulation resistance of non-EQ cable and connection insulation of the in scope portions of Neutron Monitoring, Process Radiation Monitoring and Area Radiation Monitoring Systems. Calibration and cable tests will be performed and results will be assessed for reduced insulation resistance prior to the period of extended operation. Cable test frequency is based on engineering evaluation and is performed at least once every 10 years. Calibration and assessment of results is performed at least once every 10 years during the period of extended operation.	Program and initial assessment of calibration and test results to be implemented prior to the period of extended operation. Assessment schedule identified in commitment.	Section A.2.1.38
39	Inaccessible Power Cables Not Subject to 10 CFR 50.49	Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is a new program that will be used to manage the effects of reduced insulation resistance of non-EQ, in scope, inaccessible power	Program and initial tests and inspections to be implemented prior to the	Section A.2.1.39

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
	Environmental Qualification Requirements	cables. Cables will be tested using one or more proven tests for detecting deterioration of the insulation system. The cables will be tested at least once every six years. More frequent testing may occur based on test results and operating experience. Manholes associated with the cables included in this aging management program will be inspected for water collection with subsequent corrective actions (e.g., water removal), as necessary. Prior to the period of extended operation, the frequency of inspections for accumulated water will be established and adjusted based on plant specific operating experience with cable wetting or submergence, including water accumulation over time and event driven occurrences such as heavy rain or flooding. Operation of dewatering devices will be verified prior to any known or predicted heavy rain or flooding event. During the period of extended operation, the inspections will occur at least annually.	period of extended operation. Test and Inspection schedule identified in commitment.	
40	Metal Enclosed Bus	Metal Enclosed Bus is an existing program that will be enhanced to: 1. Specify internal inspections will be performed for accessible non-segregated bus duct sections that are in scope for license renewal. 2. Clarify requirements for visual inspections of internal portions (bus enclosure assemblies); bus insulation; internal bus insulating supports; accessible gaskets, boots and sealants; and bus duct external surfaces. 3. Specify a sample size of 20 percent of the accessible bolted connection population, with a maximum sample size of 25, will be inspected for increased resistance of connection by either thermography or measuring the connection resistance using a micro ohmmeter. 4. Specify an inspection frequency of at least every 10 years.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.40
41	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that will implement one-time testing of a representative sample (20 percent with a maximum sample size of 25) of non-EQ electrical cable connections to ensure that either increased resistance of connection is not occurring or that the existing preventive maintenance program is effective such that a periodic inspection program is not required.	Program and one-time tests to be implemented prior to the period of extended operation.	Section A.2.1.41

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
42	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program is a new condition monitoring program that performs periodic visual inspections to verify the integrity of internal coatings designed to adhere to and protect the base metal.	Program to be implemented prior to the period of extended operation. Baseline inspections will occur in the 10-year period prior to the period of extended operation.	Section A.2.2.1
43	Fatigue Monitoring	Fatigue Monitoring is an existing program that will be enhanced to: 1. Impose administrative transient cycle limits corresponding to the limiting numbers of cycles used in the environmental fatigue calculations. 2. Evaluate the impact of the reactor coolant environment on Class 1 components including valves and pumps if they are more limiting than those considered in NUREG/CR-6260.	Program to be enhanced prior to the period of extended operation. Any additional environmental fatigue evaluations to be performed prior to the period of extended operation.	Section A.3.1.1
44	Concrete Containment Tendon Prestress	Concrete Containment Tendon Prestress is an existing condition monitoring program that will be enhanced to: 1. For each surveillance interval, trending lines will be updated through the period of extended operation as part of the regression analysis and compared to the predicted lower limit and minimum required values for each tendon group.	Program to be enhanced prior to the period of extended operation.	Section A.3.1.2
45	Environmental Qualification (EQ) of Electric Components	Existing program is credited.	Ongoing	Section A.3.1.3
46	Operating Experience	Existing program is credited.	Ongoing	Section A.1.6

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
47	TLAA - Slip Joint Clamp	Prior to exceeding the limiting fluence value of 1.17E+20 n/cm^2 at the Unit 1 jet pump slip joint clamp location, estimated to be at 50.7 EFPY, revise the analysis for the slip joint clamps for a higher acceptable fluence value or take other corrective action such as repair or replacement of the clamps to ensure acceptable clamp preload.	Prior to the period of extended operation	Section A.4.2.10

APPENDIX B AGING MANAGEMENT PROGRAMS
TABLE OF CONTENTS

B.1 Introduction

B.1.1 Overview

License renewal Aging Management Program (AMP) descriptions are provided in this appendix for each program credited for managing aging effects based upon the Aging Management Review (AMR) results provided in Sections 3.1 through 3.6 of this application.

In general, there are four types of AMPs:

- Preventive programs preclude aging effects from occurring.
- Mitigative programs slow the effects of aging.
- Condition monitoring programs inspect/examine for the presence and extent of aging.
- Performance monitoring programs test the ability of a structure or component to perform its intended function.

More than one type of AMP may be implemented for a component to ensure that aging effects are managed.

Part of the demonstration that the effects of aging are adequately managed is to evaluate credited programs and activities against certain required attributes. Each of the AMPs described in this section has 10 elements which are consistent with the attributes described in Appendix A.1, "Aging Management Review – Generic (Branch Technical Position RLSB-1)" and in Table A.1-1 "Elements of an Aging Management Program for License Renewal" of NUREG-1800. The 10-element detail is not provided when the program is deemed to be consistent with the assumptions made in NUREG-1801. The 10-element detail is only provided when the program is plant-specific.

Credit has been taken for existing plant programs whenever possible. As such, all programs and activities associated with a system, structure, component, or commodity grouping were considered. Existing programs and activities that apply to systems, structures, components, or commodity groupings were reviewed to determine whether they include the necessary actions to manage the effects of aging.

Existing plant programs were often based on a regulatory commitment or requirement, rather than aging management. Many of these existing programs included the required license renewal 10-element attributes and have been demonstrated to adequately manage the identified aging effects. If an existing program did not adequately manage an identified aging effect, the program was enhanced as necessary. In some cases, the creation of a new program was necessary.

B.1.2 Method of Discussion

For those AMPs that are consistent with the assumptions made in Sections X and XI of NUREG-1801 or are consistent with exceptions or enhancements, each program discussion is presented in the following format:

- A Program Description abstract of the overall program form and function is provided.
- A NUREG-1801 Consistency statement is made about the program.
- Exceptions to the NUREG-1801 program are outlined, and a justification for the exceptions is provided.
- Enhancements or additions to the NUREG-1801 program are provided. A proposed schedule for completion is discussed.
- Operating Experience (OE) information specific to the program is provided.
- A Conclusion section provides a statement of reasonable assurance that the program is effective or will be effective when implemented, if new or enhanced.

The plant-specific AMPs 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 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. The Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls and is applicable to the safety-related and nonsafety-related systems, structures, components (SSCs), and commodity groups that are subject to AMR. Generically, the three elements are applicable as follows:

Corrective Actions:

A single corrective action program is applied regardless of the safety classification of the system, structure, component, or commodity group. Corrective actions are implemented through the initiation of an issue report (IR) in accordance with the corrective action program in place to meet the requirements of 10 CFR 50, Appendix B. The corrective action program requires the initiation of an IR for actual or potential problems, including unexpected plant equipment degradation, damage, failure, malfunction, or loss of function. Site documents that implement aging management programs for license renewal direct that an IR be prepared in accordance with those procedures whenever non-conforming conditions are found (i.e., the acceptance criteria are not met).

Equipment deficiencies are corrected through the work control process in accordance with plant procedures. The corrective action program specifies that for equipment deficiencies an IR be initiated for condition identification, assignment of significance level and investigation class, investigation, corrective action determination, investigation report review and approval, action tracking, and trend analysis.

The corrective action program implements the requirements of NO-AA-10, the Exelon Quality Assurance Topical Report (QATR), Chapter 16, "Corrective Action." Specifically, conditions adverse to quality and significant conditions adverse to quality are resolved through direct action, the implementation of corrective actions, and where appropriate, the implementation of corrective actions to prevent recurrence.

Confirmation Process:

The focus of the confirmation process is on the followup actions that must be taken to verify effective implementation of corrective actions. The measure of effectiveness is in terms of correcting and precluding repetition of adverse conditions. The corrective action program includes provisions for timely evaluation of adverse conditions and implementation of corrective actions required, including root cause determinations and prevention of recurrence where appropriate (e.g., significant conditions adverse to quality). The corrective action program manages tracking, coordinating, monitoring, reviewing, verifying, validating, and approving corrective actions, to ensure effective corrective actions are taken. The corrective action program also includes monitoring for potentially adverse trends. The existence of an adverse trend due to recurring or repetitive adverse conditions results in the initiation of an IR. The aging management programs required for license renewal would also result in identification of related unsatisfactory conditions due to ineffective corrective action.

Since the same 10 CFR 50, Appendix B corrective actions and confirmation process is applied for nonconforming safety-related and nonsafety-related systems, structures, and components subject to AMR for license renewal, the corrective action program is consistent with the NUREG-1801 elements.

Administrative Controls:

The document control process applies to all generated documents, procedures, and instructions regardless of the safety classification of the associated system, structure, component, or commodity group. Document control processes are implemented in accordance with the requirements of 10 CFR 50, Appendix B, "Quality Assurance Requirements for Nuclear Power Plants and Fuel Reprocessing Plants." Implementation is further defined in NO-AA-10, the Exelon Quality Assurance Topical Report (QATR), Chapter 6, "Document Control."

Administrative controls procedures provide information on procedures, instructions and other forms of administrative control documents, as well as guidance on classifying these documents into the proper document type and as-building frequency. Revisions will be made to procedures and instructions that implement or administer aging management program requirements for the purposes of managing the associated aging effects for the period of extended operation.

B.1.4 Operating Experience

Operating experience from internal (also referred to as plant-specific) and external (also referred to as industry) sources is captured and systematically reviewed on an ongoing basis in accordance with the Quality Assurance program, which meets the requirements of 10 CFR Appendix B, and the Operating Experience (OPEX) program, which meets the requirements of NUREG- 0737, “Clarification of TMI Action Plan Requirements,” Item I.C.5, “Procedures for Feedback of Operating Experience to Plant Staff.” The OPEX program interfaces with and relies on active participation in the “Institute of Nuclear Power Operations” Operating Experience program, as endorsed by the NRC.

Operating experience is used at LSCS to enhance plant programs, prevent repeat events, and prevent events that have occurred at other plants. As part of the Exelon fleet, LSCS personnel receive operating experience (internal and external to Exelon Nuclear) daily. The OPEX process includes screening, evaluation, and acting on operating experience documents and information to prevent or mitigate the consequences of similar events. The OPEX process includes review of operating experience from external and internal sources. External operating experience includes INPO documents, NRC documents (e.g., GALL Revisions, Information Notices, Regulatory Information Summaries, Interim Staff Guidance), and other documents (e.g., Licensee Event Reports, 10 CFR Part 21 Reports). Internal operating experience includes event investigations, trending reports, and lessons learned from in-house events as captured in program health reports, program assessments, and in the 10 CFR Part 50, Appendix B corrective action program.

The Exelon fleet OPEX program that is implemented at LSCS is an ongoing program that conforms to the recommendations of LR-ISG-2011-05, “Ongoing Review of Operating Experience.” The systematic review of plant-specific and industry operating experience concerning aging management and age-related degradation ensures that the license renewal aging management programs (AMPs) are, and will continue to be, effective in managing the aging effects for which they are credited. The AMPs are either enhanced or new AMPs developed, as appropriate, when it is determined through the evaluation of operating experience that the effects of aging may not be adequately managed. AMPs are informed by the review of operating experience on an ongoing basis, regardless of the AMP’s implementation schedule. Guidelines have been established for reporting plant-specific operating experience on age-related degradation and aging management to the industry through the INPO OPEX program.

Each AMP summary in this appendix contains a discussion of operating experience relevant to the program. This information was obtained through the review of internal operating experience captured by the corrective action program, program assessments, program health reports, and through the review of external operating experience. Additionally, operating experience was obtained through interviews with system engineers, program engineers, and other plant personnel. New programs utilized internal and/or external operating experience as applicable, and the AMP summaries in this appendix discuss the operating experience and associated corrective actions as they relate to implementation of the new program. The operating experience in each AMP summary identifies past corrective actions that have resulted in program enhancements and provides objective evidence that the effects of aging have been, and will continue to be, adequately managed so that the intended functions of the structures and components within the scope of each program will be maintained during the period of extended operation.

B.1.5 NUREG-1801 Chapter XI Aging Management Programs

The following AMPs are described in the sections listed in this appendix. The programs are either generic in nature as discussed in NUREG-1801, Section XI, or are plant-specific. The programs that are based on 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 fully consistent with or are, with some exceptions, consistent with programs discussed in NUREG-1801. Programs are identified as either existing or new. If the program requires enhancement to be consistent with NUREG-1801, that is noted.

1. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (Section B.2.1.1) [Existing]
2. Water Chemistry (Section B.2.1.2) [Existing]
3. Reactor Head Closure Stud Bolting (Section B.2.1.3) [Existing]
4. BWR Vessel ID Attachment Welds (Section B.2.1.4) [Existing]
5. BWR Feedwater Nozzle (Section B.2.1.5) [Existing]
6. BWR Control Rod Drive Return Line Nozzle (Section B.2.1.6) [Existing]
7. BWR Stress Corrosion Cracking (Section B.2.1.7) [Existing]
8. BWR Penetrations (Section B.2.1.8) [Existing]
9. BWR Vessel Internals (Section B.2.1.9) [Existing - Requires Enhancement]
10. Flow-Accelerated Corrosion (Section B.2.1.10) [Existing]
11. Bolting Integrity (Section B.2.1.11) [Existing - Requires Enhancement]
12. Open-Cycle Cooling Water System (Section B.2.1.12) [Existing - Requires Enhancement]
13. Closed Treated Water Systems (Section B.2.1.13) [Existing - Requires Enhancement]

14. Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (Section B.2.1.14) [Existing - Requires Enhancement]

15. Compressed Air Monitoring (Section B.2.1.15) [Existing - Requires Enhancement]

16. Fire Protection (Section B.2.1.16) [Existing - Requires Enhancement]

17. Fire Water System (Section B.2.1.17) [Existing - Requires Enhancement]

18. Aboveground Metallic Tanks (Section B.2.1.18) [Existing - Requires Enhancement]

19. Fuel Oil Chemistry (Section B.2.1.19) [Existing - Requires Enhancement]

20. Reactor Vessel Surveillance (Section B.2.1.20) [Existing]

21. One-Time Inspection (Section B.2.1.21) [New]

22. Selective Leaching (Section B.2.1.22) [New]

23. One-time Inspection of ASME Code Class 1 Small-Bore Piping (Section B.2.1.23) [New]

24. External Surfaces Monitoring of Mechanical Components (Section B.2.1.24) [New]

25. Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (Section B.2.1.25) [New]

26. Lubricating Oil Analysis (Section B.2.1.26) [Existing]

27. Monitoring of Neutron-Absorbing Materials Other Than Boraflex (Section B.2.1.27) [Existing - Requires Enhancement]

28. Buried and Underground Piping (Section B.2.1.28) [Existing - Requires Enhancement]

29. ASME Section XI, Subsection IWE (Section B.2.1.29) [Existing - Requires Enhancement]

30. ASME Section XI, Subsection IWL (Section B.2.1.30) [Existing - Requires Enhancement]

31. ASME Section XI, Subsection IWF (Section B.2.1.31) [Existing - Requires Enhancement]

32. 10 CFR Part 50, Appendix J (Section B.2.1.32) [Existing]

33. Masonry Walls (Section B.2.1.33) [Existing - Requires Enhancement]

34. Structures Monitoring (Section B.2.1.34) [Existing - Requires Enhancement]

35. RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (Section B.2.1.35) [Existing - Requires Enhancement]

36. Protective Coating Monitoring and Maintenance Program (Section B.2.1.36) [Existing]

37. Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B.2.1.37) [New]

38. Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (Section B.2.1.38) [New]

39. Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B.2.1.39) [New]

40. Metal Enclosed Bus (Section B.2.1.40) [Existing - Requires Enhancement]

41. Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B.2.1.41) [New]

B.1.6 Plant-Specific Aging Management Programs

The following plant-specific aging management program is described in Section B.2.2 of this appendix as indicated. The program is identified as either existing or new.

1. Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (Section B.2.2.1) [New]

B.1.7 NUREG-1801 Chapter X Aging Management Programs

The following programs that are based on NUREG-1801 Chapter X AMPs are described in Section B.3 of this appendix as indicated. Programs are identified as either existing or new. If the program requires enhancement to be consistent with NUREG-1801, that is noted.

1. Fatigue Monitoring (Section B.3.1.1) [Existing – Requires Enhancement]
2. Concrete Containment Tendon Prestress (Section B.3.1.2) [Existing Requires Enhancement]
3. Environmental Qualification (EQ) of Electric Components (Section B.3.1.3) [Existing]

B.2 Aging Management Programs

B.2.0 NUREG-1801 Aging Management Program Correlation

The correlation between the NUREG-1801 (Generic Aging Lessons Learned (GALL)) programs and the LSCS Aging Management Programs (AMPs) is shown below. Links to the sections describing the LSCS NUREG-1801 programs are provided.

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	LSCS PROGRAM
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (Section B.2.1.1)
XI.M2	Water Chemistry	Water Chemistry (Section B.2.1.2)
XI.M3	Reactor Head Closure Stud Bolting	Reactor Head Closure Stud Bolting (Section B.2.1.3)
XI.M4	BWR Vessel ID Attachment Welds	BWR Vessel ID Attachment Welds (Section B.2.1.4)
XI.M5	BWR Feedwater Nozzle	BWR Feedwater Nozzle (Section B.2.1.5)
XI.M6	BWR Control Rod Drive Return Line Nozzle	BWR Control Rod Drive Return Line Nozzle (Section B.2.1.6)
XI.M7	BWR Stress Corrosion Cracking	BWR Stress Corrosion Cracking (Section B.2.1.7)
XI.M8	BWR Penetrations	BWR Penetrations (Section B.2.1.8)
XI.M9	BWR Vessel Internals	BWR Vessel Internals (Section B.2.1.9)
XI.M10	Boric Acid Corrosion	Not Applicable (LSCS Units 1 and 2 are BWRs)
XI.M11B	Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components	Not Applicable (LSCS Units 1 and 2 are BWRs)
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	This program is not used or credited. LSCS Units 1 and 2 do not have any components that require the Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program for aging management.

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	LSCS PROGRAM
XI.M16A	PWR Vessel Internals	Not Applicable (LSCS Units 1 and 2 are BWRs)
XI.M17	Flow-Accelerated Corrosion	Flow-Accelerated Corrosion (Section B.2.1.10)
XI.M18	Bolting Integrity	Bolting Integrity (Section B.2.1.11)
XI.M19	Steam Generators	Not Applicable (LSCS Units 1 and 2 are BWRs)
XI.M20	Open-Cycle Cooling Water System	Open-Cycle Cooling Water System (Section B.2.1.12)
XI.M21A	Closed Treated Water Systems	Closed Treated Water Systems (Section B.2.1.13)
XI.M22	Boraflex Monitoring	This program is not credited for aging management. Boraflex is not a credited neutron-absorbing material in the LSCS spent fuel pool racks.
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 (Section B.2.1.14)
XI.M24	Compressed Air Monitoring	Compressed Air Monitoring (Section B.2.1.15)
XI.M25	BWR Reactor Water Cleanup System	This program is not used. All stainless steel welds in Reactor Water Cleanup system piping are managed by the BWR Stress Corrosion Cracking program.
XI.M26	Fire Protection	Fire Protection (Section B.2.1.16)
XI.M27	Fire Water System	Fire Water System (Section B.2.1.17)
XI.M29	Aboveground Metallic Tanks	Aboveground Metallic Tanks (Section B.2.1.18)
XI.M30	Fuel Oil Chemistry	Fuel Oil Chemistry (Section B.2.1.19)
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance (Section B.2.1.20)
XI.M32	One-Time Inspection	One-Time Inspection (Section B.2.1.21)
XI.M33	Selective Leaching	Selective Leaching (Section B.2.1.22)

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	LSCS PROGRAM
XI.M35	One-time Inspection of ASME Code Class 1 Small Bore-Piping	One-time Inspection of ASME Code Class 1 Small-Bore Piping (Section B.2.1.23)
XI.M36	External Surfaces Monitoring of Mechanical Components	External Surfaces Monitoring of Mechanical Components (Section B.2.1.24)
XI.M37	Flux Thimble Tube Inspection	Not Applicable (LSCS Units 1 and 2 are BWRs)
XI.M38	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (Section B.2.1.25)
XI.M39	Lubricating Oil Analysis	Lubricating Oil Analysis (Section B.2.1.26)
XI.M40	Monitoring of Neutron-Absorbing Materials Other Than Boraflex	Monitoring of Neutron-Absorbing Materials Other Than Boraflex (Section B.2.1.27)
XI.M41	Buried and Underground Piping and Tanks	Buried and Underground Piping (Section B.2.1.28)
XI.S1	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE (Section B.2.1.29)
XI.S2	ASME Section XI, Subsection IWL	ASME Section XI, Subsection IWL (Section B.2.1.30)
XI.S3	ASME Section XI, Subsection IWF	ASME Section XI, Subsection IWF (Section B.2.1.31)
XI.S4	10 CFR Part 50, Appendix J	10 CFR Part 50, Appendix J (Section B.2.1.32)
XI.S5	Masonry Walls	Masonry Walls (Section B.2.1.33)
XI.S6	Structures Monitoring	Structures Monitoring (Section B.2.1.34)
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (Section B.2.1.35)
XI.S8	Protective Coating Monitoring and Maintenance Program	Protective Coating Monitoring and Maintenance Program (Section B.2.1.36)
XI.E1	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B.2.1.37)

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	LSCS PROGRAM
XI.E2	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (Section B.2.1.38)
XI.E3	Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B.2.1.39)
XI.E4	Metal Enclosed Bus	Metal Enclosed Bus (Section B.2.1.40)
XI.E5	Fuse Holders	Not used. There are no LSCS Fuse Holders (not part of active equipment): Metallic Clamps in scope for LSCS license renewal. Therefore, there are no fuse holders subject to aging management review.
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 (Section B.2.1.41)
X.M1	Fatigue Monitoring	Fatigue Monitoring (Section B.3.1.1)
X.S1	Concrete Containment Tendon Prestress	Concrete Containment Tendon Prestress (Section B.3.1.2)
X.E1	Environmental Qualification (EQ) of Electrical Components	Environmental Qualification (EQ) of Electrical Components (Section B.3.1.3)
N/A	LaSalle Plant-Specific Program	Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1)

B.2.1 NUREG-1801 Chapter XI Aging Management Programs

This section provides summaries of the NUREG-1801 Chapter XI programs credited for managing the effects of aging.

B.2.1.1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

Program Description

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program is an existing condition monitoring program which manages the aging effects of cracking and loss of fracture toughness in Class 1, 2, and 3 piping and components exposed to reactor coolant environment. This program includes periodic visual, surface, and volumetric examination of Class 1, 2, and 3 pressure-retaining components. The program implements the Inservice Inspection (ISI) requirements of ASME Code, Section XI, for Class 1, 2, and 3 pressure-retaining components, their integral attachments, and pressure-retaining bolting. Examination of these components is in accordance with Subsections IWB, IWC, and IWD respectively.

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program implements the required component examination schedule per ASME Section XI, Subsection IWB-2400, IWC-2400, or IWD-2400 and examination categories, applicable components, examination methods, acceptance standards, and frequency of examination as specified in Tables IWB-2500-1, IWC-2500-1, and IWD-2500-1. The examination methods specified in Tables IWB-2500-1, IWC-2500-1, and IWD-2500-1 are based on approved industry standards for detecting degradation of components. The program requires that indications and relevant conditions detected during examinations be evaluated in accordance with ASME Section XI, Articles IWB-3000 for Class 1, IWC-3000 for Class 2, and IWD-3000 for Class 3. The program directs that repair and replacement activities be performed in conformance with IWA-4000.

For the current third 10-year inspection interval, the ISI program applies the requirements of ASME Code, Section XI, 2001 Edition through 2003 Addenda, and Risk Informed Inservice Inspection (RI-ISI) alternative requirements to Examination Categories B-F, B-J, C-F-1 and C-F-2 for Class 1 and Class 2 piping welds as approved by relief request. ASME Code, Section XI, 2007 Edition through 2008 Addenda is used for examination of Examination Categories B-L-1, B-M-1, and C-G components as approved by relief request. Examination locations, and the number of locations requiring examination, are based on the guidelines provided in EPRI-112657, “Revised Risk Informed Inservice Inspection Evaluation Procedure,” Revision B-A, and ASME Code Case N-578-1. Risk informed inspection methodology has also been applied for Break Exclusion Region (BER) piping per EPRI-1006937, Revision 0-A, “Extension of the EPRI Risk-Informed Inservice Inspection (RI-ISI) Methodology to Break Exclusion Region (BER) Programs.”

In accordance with 10 CFR 50.55a(g)(4), the ISI program is updated each successive 120-month inspection interval to comply with the requirements of the latest edition of the ASME Code specified 12 months before the start of the inspection interval. Any deviation from ASME Code, Section XI requirements must be approved by the NRC per a relief request.

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program includes all component inspection activity required by ASME Code, Section XI, Subsections IWB, IWC, and IWD except for those components that are covered by the following license renewal aging management programs that include augmented requirements:

- Reactor Head Closure Stud Bolting (B.2.1.3)
- BWR Vessel ID Attachment Welds (B.2.1.4)
- BWR Feedwater Nozzle (B.2.1.5)
- BWR Control Rod Drive Return Line Nozzle (B.2.1.6)
- BWR Stress Corrosion Cracking (B.2.1.7)
- BWR Penetrations (B.2.1.8)
- BWR Vessel Internals (B.2.1.9)
- One-time Inspection of ASME Code Class 1 Small-Bore Piping (B.2.1.23)

NUREG-1801 Consistency

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program is consistent with the ten elements of aging management program XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. Cracking due to intergranular stress corrosion cracking (IGSCC) has occurred in small-bore and large diameter BWR piping made of austenitic

stainless steels and nickel alloys as described in NRC GL 88-01. The augmented ISI program to perform examinations to identify stress corrosion cracking per NRC GL 88-01 and NUREG-0313 guidelines has been in place since 1988. In 1986, two welds on Unit 1, that were later within the scope of NRC GL 88-01, had flaws identified. In 1990, the crowns on these welds were machined and subsequent volumetric examination characterized these as root geometry indications, not IGSCC cracks. There are currently no piping system welds within the scope of the ISI program that have IGSCC cracks.

This example illustrates how implementation of industry operating experience from NRC GL 88-01 and volumetric examination was applied to identify an indication in a susceptible reactor coolant pressure boundary weld within the scope of the ISI program. This example also demonstrates how the industry guidelines are effectively applied to classify a weld with cracking indication and appropriately schedule and perform examinations to verify the condition of the weld is acceptable for continued service. This example also demonstrates that the piping systems that are susceptible to IGSCC are in good material condition.

2. Cracking has been observed in core shrouds fabricated from both Type 304 and Type 304L stainless steel (SS) at both horizontal and vertical welds. Type 304L SS is more resistant to SCC, and weld regions are most susceptible to SCC. This industry experience is documented in NRC Generic Letter 94-03 and Information Notices 94-42 and 97-17. The core shrouds are fabricated from Type 304L SS. Baseline core shroud examinations were performed in accordance with BWRVIP-07 requirements on Unit 1 in 1996, and on Unit 2 in 1995. Routine examinations are continuing at the frequency, and using the methods, required by BWRVIP reports, based on historical examination results.

Minor cracking has been identified in core shroud welds on Unit 1 and entered into the corrective action program. Expanded scope inspections and structural evaluations have been performed in accordance with BWRVIP guidelines each time new indications were identified. Cracking indications have not been identified in core shroud welds on Unit 2.

This example provides objective evidence that the ISI program implements examinations using the methods and inspection frequency recommended in the appropriate BWRVIP guidelines. This example also illustrates that ISI examinations performed by qualified personnel, are capable of detecting flaws in reactor vessel internal components and that the core shrouds are in good material condition. The example also demonstrates that deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate deficiencies.

3. Cracking in shroud support plate access hole covers (AHCs) has been reported in other BWRs, as documented in NRC Information Notices IN 88-03 and IN 92-57. Unit 1 and 2 AHCs are classified as a Group 6 design, which is less susceptible to IGSCC than other designs. Examinations were performed on the 0 degree and 180 degree shroud AHCs on Unit 1 in 1996 and 2004 using VT-1 exam method. Examinations were performed using EVT-1 exam method in 1999, 2008, and 2012. Examinations were performed on Unit 2

using VT-1 method in 1996, 2000, 2005, and 2007. Examinations were performed on Unit 2 in 2009 using EVT-1 method. No indications have been identified on any of the AHCs. Future examinations of the shroud AHCs will be in accordance with BWRVIP-180, which requires the use of EVT-1 or ultrasonic test (UT) methods for a Group 6 AHC design.

This example provides objective evidence that the ISI program implements examinations using the methods and inspection frequency recommended in the appropriate BWRVIP guidelines. This example also illustrates that the AHCs are in good material condition.

4. Cracking in core spray internal piping has occurred in some BWRs as discussed in NRC Bulletin 80-13 and BWRVIP-18-A. In 2004, Unit 1 accessible core spray piping welds internal to the reactor vessel were inspected using volumetric examination and three welds had a total of five recordable indications. A corrective action program issue report was initiated and the condition was evaluated as acceptable for one operating cycle. These welds were inspected in 2006 with no notable change identified. These welds were inspected in 2008 and the indications at two of the welds were re-classified as geometric reflectors. The indication at weld BP-4a was re-sized and evaluated as acceptable for two operating cycles. Inspection of weld BP-4a in 2012 indicated no notable change and evaluated the condition as acceptable for two operating cycles. The Unit 2 accessible core spray piping welds internal to the reactor vessel have been inspected using volumetric examination and no indications have been recorded.

This example provides objective evidence that the ISI program implements examinations using the methods and examination frequency recommended in the appropriate BWRVIP guidelines. This example also illustrates that ISI examinations performed by qualified personnel, are capable of detecting flaws and other indications of possible aging-related degradation of reactor vessel internal components and that the core spray spargers are in good material condition. The example demonstrates that deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate deficiencies.

5. On Unit 2, in 2005, during a magnetic particle surface examination of an ASME Code Class 2 pipe performed in accordance with AMSE Code Section XI, Table IWC-2500-1, Examination Category C3.20, several indications were identified in the pipe base metal near a lug weldment. The indications did not meet ASME Code Section XI, IWC-3500 and IWB-3500 acceptance criteria and a corrective action program issue report was initiated. The indications were completely removed by controlled mechanical removal. Volumetric examination verified acceptable pipe wall thickness following flaw removal.

This example provides objective evidence that the ISI program implements examinations using the methods specified by ASME Code Section XI. This example also illustrates that ISI examinations performed by qualified personnel, are capable of detecting flaws in piping components. The example also demonstrates that deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate and correct deficiencies.

The operating experience relative to the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking and loss of fracture toughness. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program provides reasonable assurance that cracking and loss of fracture toughness aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.2 Water Chemistry

Program Description

The Water Chemistry aging management program is an existing mitigative program whose activities mitigate the loss of material, cracking, and reduction of heat transfer in components exposed to a treated water environment. The program includes periodic monitoring of the treated water and control of known detrimental contaminants such as chlorides, dissolved oxygen, and sulfate concentrations below the levels known to result in loss of material or cracking in accordance with BWRVIP-190, Revision 1, EPRI-3002002623.

The Water Chemistry program consists of monitoring and controlling the chemical environments of those systems that are exposed to reactor coolant, steam, condensate and feedwater, control rod drive water, demineralized water, suppression pool water, and spent fuel pool water, such that aging effects of system components are minimized in accordance with BWRVIP-190.

Major component types managed by the Water Chemistry program include the reactor vessel, reactor internals, piping, piping elements and piping components, heat exchangers and tanks. Reactor coolant, condensate, control rod drive water, feedwater, demineralized water storage tank water, suppression pool water, and spent fuel pool water are classified as treated water for aging management.

The Water Chemistry program is also credited for mitigating loss of material for components exposed to a sodium pentaborate environment. The Standby Liquid Control (SLC) system contains a demineralized water and sodium pentaborate solution controlled in accordance with plant procedures and Technical Specifications. The managing of loss of material on SLC system components subject to the sodium pentaborate environment includes monitoring and control of SLC storage tank makeup water chemistry. The makeup water, from the clean condensate storage tank, is monitored in lieu of the sodium pentaborate solution in the storage tank, because the sodium pentaborate would mask of the chemistry parameters monitored. The chloride content of the sodium pentaborate powder is certified by the manufacturer to have low levels of chloride contamination.

Industry experience has shown that water chemistry programs may not be effective in low flow or stagnant flow areas of plant systems. The Water Chemistry program does not provide for detection of aging effects. However, components located in such areas will receive a one-time inspection prior to the period of extended operation. These inspections will be performed as part of the One-Time Inspection (B.2.1.21) aging management program. This program includes provisions specified by NUREG-1801 for the verification of effective chemistry control and aging management.

NUREG-1801 Consistency

The Water Chemistry aging management program is consistent with the ten elements of aging management program XI.M2, "Water Chemistry," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

1. The NUREG-1801 Revision 2 Chapter XI.M2, Water Chemistry aging management program relies on the monitoring and control of reactor water chemistry based on the guidelines contained in the Boiling Water Reactor Vessel and Internals Project (BWRVIP)-190, Revision 0 (Electric Power Research Institute [EPRI] 1016579) that was issued in 2008. BWRVIP-190, Revision 1 (EPRI 3002002623) was issued in 2014. The LaSalle Water Chemistry aging management program is based on BWRVIP-190, Revision 1 as revised in 2014. **Program Element Affected: Scope of Program (Element 1)**

Justification for Exception:

EPRI periodically revises the water chemistry guidelines as new information becomes available based on industry operating experience, best practices, and research. In all instances, the chemistry parameter guidelines for Action Levels in BWRVIP-190, Revision 1 are the same or more restrictive than in BWRVIP-190, Revision 0. In no instances are the chemistry parameter guidelines relaxed. Therefore the LaSalle Water Chemistry aging management program, as defined by BWRVIP-190, Revision 1, will continue to be effective in mitigating the loss of material due to corrosion, cracking due to stress corrosion cracking and related mechanisms, and reduction of heat transfer due to fouling in components exposed to a treated water environment.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Water Chemistry program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. During start-up of Unit 2 in November of 2002, reactor coolant chloride concentration exceeded the EPRI Action Level 1 limits. A corrective action program issue report was initiated. Increased sampling was performed in accordance with station procedures. The excursion was a result of the reactor water clean-up system tripping and the exhaustion of inservice condensate polisher beds. As a result, impurities were not removed from reactor coolant during reactor start-up for a period of 28 hours. Two condensate polishers were also in service during the outage to clean-up hotwell water inventory. During this clean-up period, influent water to the polishers have high impurity concentrations that cause the resin beds to be exhausted prematurely

compared to full power operation. These two evolutions caused an increase in chloride impurities within the reactor coolant. Station chemistry monitoring allowed for the timely detection of high reactor coolant chloride concentration. In addition the cause of the excursion was quickly identified and concentrations were returned to normal in a timely manner. This minimized high concentrations of impurities within the reactor coolant that can increase the corrosive environments that promote intergranular stress corrosion cracking. The example provides objective evidence that water chemistry parameters are monitored and corrective actions are taken in accordance with industry guidelines and station procedures.

2. In 2008 a focused area self-assessment (FASA) was performed to identify and correct gaps between LSCS practices and the attributes from INPO Guideline 07-004 and the EPRI Fuel Reliability Guidelines. The FASA Team was comprised of interdisciplinary members from the station, the industry, and WANO. During this review it was recommended that procedural requirements be placed on turbidity prior to transferring water into the reactor cavity and that sources of reactor coolant system makeup water be systematically verified to be free of debris. These recommendations were incorporated into the water chemistry program via a procedure revision that set a turbidity goal of < 5.0 NTU (Nephelometric Turbidity Units) for suppression pool water used for reactor cavity flood-up during outages. This example provides objective evidence that the water chemistry program includes periodic assessments and industry recommendations to improve the program are implemented.

3. On December 22, 2009, the Unit 2 suppression pool conductivity was 5.59 micromho/cm (umho/cm), above the procedure goal of <5.0 umho/cm. A corrective action program issue report was initiated. Turbidity was measured and found to be 14.1 NTU (Nephelometric Turbidity Units) and above the goal of <5.0 NTU. An increase in the nitrate level was also observed but no limit or goal was exceeded for this parameter. All of the other parameters were within goal and limit. Investigation determined that the cause of the high conductivity was the result of a suppression pool contamination event that occurred in 2007. The contamination event introduced sodium nitrate into the pool which caused conductivity and sodium and nitrate values to increase. The delay in the increased conductivity levels was attributed to the large volume of the suppression pool resulting in an extended time for the contaminants to fully mix within the pool such that adverse sample results would manifest themselves. Chemistry continued to sample and perform evaluations from the various sample points to ensure that pool did not have localized contamination or pocketing issues. This example provides objective evidence that the water chemistry program is effective in monitoring important system parameters and identifying the cause of adverse indications.

The operating experience relative to the Water Chemistry program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking, loss of material and reduction of heat transfer. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Water Chemistry program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the Water Chemistry program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing Water Chemistry program provides reasonable assurance that the identified aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.3 Reactor Head Closure Stud Bolting

Program Description

The Reactor Head Closure Stud Bolting aging management program is an existing condition monitoring and preventive program that includes ASME Code, Section XI examinations of reactor head closure studs and associated nuts, washers, bushings, and flange threads to manage cracking and loss of material. The Reactor Head Closure Stud Bolting program manages these aging effects in an air with reactor coolant leakage environment. The program is based on the examination requirements specified in the ASME Code, Section XI, Subsection IWB, Table IWB-2500-1, and preventive measures recommended within NRC Regulatory Guide (RG) 1.65, “Materials and Inspection for Reactor Vessel Closure Studs” and NUREG-1339, “Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants.”

The Reactor Head Closure Stud Bolting program implements ASME Code, Section XI inspection requirements through the ISI Program plan. The current ISI Program plan for the third 10-year inspection interval (October 1, 2007 through September 30, 2017) is based on the 2001 ASME Code, Section XI, including 2003 addenda. The future 120-month inspection intervals will incorporate the requirements specified in the version of the ASME Code referenced in 10 CFR 50.55a 12 months before the start of the inspection interval.

The program uses visual and volumetric examinations in accordance with the general requirements of Section XI, Subsection IWA-2000 to monitor for cracking, loss of material, and coolant leakage. The extent and schedule for examining and testing the reactor head closure stud bolting components is as specified in Table IWB-2500-1 for B-G-1 components, “Pressure Retaining Bolting Greater than 2 Inches in Diameter.” The studs and flange threads receive a volumetric examination, and the surfaces of nuts, washers, and bushings are inspected using VT-1 examination. The reactor vessel flange connection is within the ASME Code Class 1 pressure-retaining boundary that receives a visual VT-2 examination per Examination Category B-P during the system leakage test that is performed during each refueling outage.

Indications and relevant degraded conditions detected during examinations are evaluated in accordance with ASME Code, Section XI, Subsection IWB-3100 for Class 1 components by comparing ISI results with the acceptance standards of IWB-3400 and IWB-3500. Flaw indications or relevant degraded conditions are evaluated in accordance with IWB-3515 or IWB-3517 as indicated in Table IWB-2500-1 and Table 3410-1 of ASME Code, Section XI.

The reactor head closure studs are fabricated from ASME SA540 Grade B24 alloy steel. The Unit 1 studs, nuts, and washers are fabricated with material that has measured yield strength above 150 ksi and several Unit 2 studs may also be fabricated from material with measured yield strength above 150 ksi. The Reactor Head Closure Stud Bolting program includes the other preventive measures described in RG 1.65, Revision 1 and NUREG-1339 to prevent cracking. The reactor head closure studs, nuts, and washers were coated with an acceptable phosphate surface treatment to inhibit corrosion. In addition, a stable lubricant that does not contain molybdenum disulfide is applied to the studs, nuts, and washers prior to reactor vessel head re-installation.

NUREG-1801 Consistency

The Reactor Head Closure Stud Bolting aging management program is consistent with the ten elements of aging management program XI.M3, "Reactor Head Closure Stud Bolting," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

1. NUREG-1801 requires, as a preventive measure that can reduce the potential for SSC, using bolting material for closure studs that has an actual measured yield strength limited to less than 1,034 megapascals (MPa) (150 kilo-pounds per square inch) (NUREG-1339). Certified Material Test Reports (CMTRs) for the materials used for installed bolting components include test data indicating that all the studs, nuts, and washers installed on Unit 1 have actual measured yield strength greater than 150 ksi, and 12 of the studs installed on Unit 2 may have actual measured yield strength greater than 150 ksi. **Program Element Affected: Preventive Measures (Element 2)**

Justification for Exception

The reactor head closure studs are fabricated from SA 540 Grade B24 alloy steel and the nuts and washers are fabricated from SA 540 Grade B23 alloy steel, both of which have a minimum yield stress of 130 ksi and a minimum tensile strength of 145 ksi. The reactor vessels are designed in accordance with the ASME Boiler and Pressure Vessel Code, Section III. The Unit 1 vessel was designed to the 1968 edition with winter 1969 Addenda and the Unit 2 vessel was designed to the 1968 edition with winter 1970 Addenda (excluding Appendix I). The design requirement for this bolting material is for the average Charpy-V impact energy to be greater than 35 ft-lbs. The materials used to fabricate all installed stud bolting components meet this design requirement.

RG 1.65, Revision 0, October 1973 describes SA 540 Grades B24 and B23 as high-strength, low alloy steel that when tempered to a maximum tensile strength of less than 170 ksi, is relatively immune to stress corrosion cracking. On Unit 1, the maximum tensile strength is 174.0 ksi for the installed studs, and 174.5 ksi for the installed nuts and washers. On Unit 2, the maximum tensile strength is 163.5 ksi for the installed studs and 156.0 ksi for the installed nuts and washers.

The CMTR data for the installed bolting material includes several sets of test data for measured yield strength, tensile strength, and Charpy V impact energy for each heat used to fabricate the studs, nuts, and washers. For the Unit 1 studs, the average measured yield strength is 156.7 ksi and the average tensile strength is 170.3 ksi. For the Unit 1 nuts and washers, the average measured yield strength is 159.6 ksi and the average tensile strength is 168.9 ksi. For the Unit 2 studs that may have measured yield strength above 150 ksi, the average measured yield strength is 146.0 ksi and the average tensile strength is

160.3 ksi.

The CMTR data indicates that the installed stud bolting components have measured yield strength that is at most marginally outside of criteria specified in Regulatory Guide 1.65, Revision 1 and NUREG-1801 for measured yield strength and other properties related to the susceptibility for cracking.

All other preventive measures listed in NUREG-1801 Chapter XI.M3, Reactor Head Closure Stud Bolting that reduces the potential for cracking are met.

- Metal-plated stud bolting is not used, which could cause degradation due to corrosion or hydrogen embrittlement;

- A phosphate surface treatment was applied to the studs, nuts, and washers during fabrication to inhibit corrosion;

- An approved stable lubricant is applied to the studs, nuts, and washers whenever the reactor head installed. The lubricant used does not contain molybdenum disulfide which has been shown to be a potential contributor to SCC.

The aging management review identified the stud bolting material as “High Strength Low Alloy Steel Bolting with Yield Strength of 150 ksi or Greater.” This resulted in identifying cracking as an aging effect requiring management. The volumetric examination method required for stud inspection per ASME Code, Section XI, Table IWB-2500-1, Category B-G-1 is appropriate to identify cracking. There have been no recordable cracking indications identified by ISI program examinations of reactor head closure components during LaSalle operating history, indicating that the installed bolting components are in excellent material condition, have an excellent operating performance history, and that the current program has been effective in managing cracking. The Reactor Head Closure Stud Bolting program will continue to include volumetric examination per Table IWB-2500-1, Category B-G-1, and therefore will be effective in managing cracking during the period of extended operation.

2. NUREG-1801 requires, as a corrective action, using material that has maximum yield strength as limited by NUREG-1339 for replacement closure stud bolting components. Certified Material Test Reports (CMTRs) for the materials used for fabrication of studs that have been purchased as replacements for Units 1 and 2 include test data indicating that they may have actual measured yield strength greater than 150 ksi. **Program Element Affected: Corrective Actions (Element 7)**

Justification for Exception

The replacement reactor head closure studs are fabricated from SA 540 Grade B24 alloy steel, which has a minimum yield stress of 130 ksi. The reactor vessels are designed in accordance with the ASME Boiler and Pressure Vessel Code, Section III. The Unit 1 vessel was designed to the 1968 edition with winter 1969 Addenda and the Unit 2 vessel was designed to the 1968 edition with winter 1970 Addenda (excluding Appendix I). The design requirement for this bolting material is for the average Charpy-V impact energy to be greater than 35 ft-lbs. The materials used to fabricate the replacement studs meet this design requirement.

RG 1.65, Revision 0, October 1973, which was current when these studs were purchased in 1992, recommended that stud bolting components be fabricated from material that has a maximum measured tensile strength of 170 ksi. RG 1.65, Revision 0 also describes SA 540 Grade B24 as high-strength, low alloy steel that when tempered to a maximum tensile strength of less than 170 ksi, is relatively immune to stress corrosion cracking. The maximum reported ultimate tensile strength for the replacement studs is 165.8 ksi. Therefore, the replacement studs are relatively immune to stress corrosion cracking.

RG 1.65, Revision 1, April 2010 recommends that reactor head closure bolting components be fabricated from material having measured yield strength less than 150 ksi to be consistent with NUREG-1339 recommendations. The CMTR data includes several sets of test data for measured yield strength, tensile strength, and Charpy V impact energy for the heat used to fabricate the replacement studs. The CMTR data indicates that the average measured yield strength for the pieces tested within the heat used for fabrication of the studs is 147.7 ksi. The maximum measured yield strength for the pieces tested is 152.1 ksi. Therefore, it is possible that the replacement studs may have measured yield strength above 150 ksi. The CMTR data indicates that the replacement studs have measured yield strength that is at most marginally above NUREG-1801 criteria for measured yield strength.

All other preventive measures listed in NUREG-1801 Chapter XI.M3, Reactor Head Closure Stud Bolting that reduces the potential for cracking are met for the replacement studs.

An additional preventive measure has been implemented to revise the purchasing requirements for RPV head stud bolting components to assure that an reactor head closure stud bolting components procured in the future have a measured yield strength less than 150 ksi as reported on CMTRs.

Since the installed studs on Units 1 and 2 are also fabricated from SA 540 Grade B24 alloy steel having measured yield strength above 150 ksi, the aging management review identified the stud bolting material as “High Strength Low Alloy Steel Bolting with Yield Strength of 150 ksi or Greater.” This resulted in identifying cracking as an aging effect requiring management. The volumetric examination method in place for stud inspection per ASME Code, Section XI, Table IWB-2500-1, Category B-G-1 is appropriate to identify cracking. There have been no recordable cracking indications identified by ISI program examinations of reactor head closure bolting components during LaSalle operating history, indicating that the current program has been effective in managing cracking. The Reactor Head Closure Stud Bolting program will continue to include volumetric examination per ASME Code, Section XI, Table IWB-2500-1, Category B-G-1, and therefore will continue to be effective in managing cracking during the period of extended operation.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Reactor Head Closure Stud Bolting program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

Unit 1

1. During the 2004 outage, reactor head closure studs and flange threads 47 through 68 were examined using the UT method. Reactor head closure nuts and washers 47 through 68 were examined using the VT-1 method. There were no recordable indications.

2. During the 2008 outage, reactor head closure studs and flange threads 1 through 22 were examined using the UT method. Reactor head closure nuts and washers 1 through 22 were examined using the VT-1 method. There were no recordable indications.

3. During the 2012 outage, reactor head closure studs and flange threads 23 through 46 were examined using the UT method. Reactor head closure nuts and washers 23 through 46 were inspected using the VT-1 method. There were no recordable indications.

Unit 2

1. During the 2007 outage, reactor head closure studs and flange threads 51 through 76 were examined using the UT method. Reactor head closure nuts and washers 51 through 76 were examined using the VT-1 method. There were no recordable indications.

2. During the 2009 outage, reactor head closure studs and flange threads 1 through 25 were examined using the UT method. Reactor head closure nuts and washers 1 through 25 were examined using the VT-1 method. There were no recordable indications.

3. During the 2011 outage, reactor head closure studs and flange threads 26 through 50 were examined using the UT method. Reactor head closure nuts and washers 26 through 50 were examined using the VT-1 method. There were no recordable indications.

These examples demonstrate that the reactor head stud bolting components are inspected in accordance with ASME Code Section XI requirements using examination techniques that would identify cracking and loss of material. The reactor head stud bolting components are in excellent material condition.

The operating experience relative to the Reactor Head Closure Stud Bolting program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking and loss of material. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Reactor Head Closure Stud Bolting program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the Reactor Head Closure Stud Bolting program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing Reactor Head Closure Stud Bolting program provides reasonable assurance that the cracking and loss of material aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.4 BWR Vessel ID Attachment Welds

Program Description

The BWR Vessel ID Attachment Welds aging management program is an existing condition monitoring program that manages the aging effect of cracking of reactor vessel internal attachment welds exposed to reactor coolant through management of water chemistry and augmented inservice inspections. The program substitutes the inspection and evaluation recommendations within BWRVIP-48-A for the requirements within ASME Code, Section XI, Table IWB-2500-1, Examination Category B-N-2. The potential for stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC) is mitigated by maintaining high water purity as described in the Water Chemistry (B.2.1.2) program. The program is implemented through station procedures that provide for mitigation of cracking of reactor vessel internal components through management of reactor water chemistry and condition monitoring through in-vessel examinations of the reactor vessel internal attachment welds. The scope of the program includes the steam dryer support and hold down bracket attachment welds, guide rod bracket attachment welds, feedwater sparger bracket attachment welds, jet pump riser brace attachment welds, core spray piping bracket attachment welds, and surveillance sample holder bracket attachment welds.

Indications are evaluated consistent with ASME Code, Section XI, Subsections IWB-3500 and IWB-3600 and the additional guidance provided in BWRVIP-48-A. If flaws are found, the scope of the inspection is expanded in accordance with the guidance provided in BWRVIP-48-A. Repair and replacement procedures comply with the requirements of ASME Code, Section XI. If the flaw exceeds the requirements of IWB-3600, repair and replacement is performed consistent with the requirements of ASME Code, Section XI, Subsection IWA-4000.

NUREG-1801 Consistency

The BWR Vessel ID Attachment Welds aging management program is consistent with the ten elements of aging management program XI.M4, "BWR Vessel ID Attachment Welds," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the BWR Vessel ID Attachment Welds program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. Examinations of the Unit 1 vessel ID attachment welds were performed using EVT-1 visual techniques during refueling outages in 2004, 2006, 2008, 2010, and 2012. The examinations included the jet pump riser brace support pads, the feedwater sparger attachment welds, the steam dryer support bracket attachment welds, and the core spray piping bracket attachment welds. No indications of cracking were identified in the attachment welds. Examination of the guide rod bracket attachment welds, steam dryer holddown attachment welds, and upper surveillance sample holder attachment welds were performed using VT-3 visual techniques during the refueling outages in 2004, 2006, 2008, and 2010. No indications of cracking were identified. Examination of the lower surveillance sample holder attachment welds was performed using VT-1 visual techniques during the refueling outages in 2004, 2006, 2008, and 2010. No indications of cracking were identified.

2. Examinations of the Unit 2 vessel ID attachment welds were performed using EVT-1 visual techniques during the refueling outages in 2005, 2007, 2011, and 2013. The examinations included the jet pump riser brace support pads, the feedwater sparger attachment welds, the steam dryer support bracket attachment welds, and the core spray piping bracket attachment welds. No indications of cracking were identified in the attachment welds. Examination of the guide rod bracket attachment welds, steam dryer holddown attachment welds, and upper surveillance sample holder attachment welds were performed using VT-3 visual techniques during the refueling outages in 2005, 2007, and 2011. No indications of cracking were identified. Examination of the lower surveillance sample holder attachment welds was performed using VT-1 visual techniques during the refueling outages in 2005 and 2011. No indications of cracking were identified.

These examples illustrate how condition monitoring in accordance with BWRVIP inspection guidelines is used to manage the effects of cracking in the vessel internal attachment welds. The inspections have not detected cracks in any of the reactor vessel attachment welds. The lack of indications in the attachment welds can be attributed to effective water chemistry management, suitable design, and effective installation practices.

The operating experience relative to the BWR Vessel ID Attachment Welds program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the BWR Vessel ID Attachment Welds program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing BWR Vessel ID Attachment Welds program provides reasonable assurance that the cracking aging effect is adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.5 BWR Feedwater Nozzle

Program Description

The BWR Feedwater Nozzle aging management program is an existing condition monitoring program that manages the aging effect of cracking in the reactor vessel feedwater nozzles. The feedwater nozzles are exposed to a reactor coolant environment. The program manages examination of feedwater nozzles in accordance with the requirements of ASME Code, Section XI, Subsection IWB, Table IWB-2500-1 and recommendations provided within BWR Owners Group Licensing Topical Report, GE-NE-523-A71-0594-A, Revision 1, May 2000. The program is implemented through the plant inservice inspection (ISI) program and specifies periodic ultrasonic test (UT) examination of critical regions of the feedwater nozzles. The inspections are performed at intervals not exceeding 10 years.

In response to NUREG-0619, design changes were made to the feedwater nozzles to mitigate or prevent thermally induced fatigue cracking. The design does not include cladding on the nozzle inner surface and uses a triple thermal sleeve feedwater nozzle design.

As recommended in NUREG-0619, mitigation of cracking in the feedwater nozzle is accomplished by using a low flow feedwater control valve for low power operations to minimize flow fluctuations. In addition, the reactor water cleanup system returns flow to both feedwater loops. Both of these measures minimize the frequency and magnitude of temperature fluctuations at the feedwater nozzles and resulting thermal fatigue. Units 1 and 2 do not have a thermal sleeve bypass leakage detection system and the inspection interval has not been modified based on leakage data.

Flaw indications are evaluated in accordance with ASME Code, Section XI, IWB-3100, using the acceptance standards of IWB-3512 as directed by Table IWB-2500-1. Inspection results that do not satisfy the acceptance standards of IWB-3500 are documented in accordance with the corrective action program.

NUREG-1801 Consistency

The BWR Feedwater Nozzle aging management program is consistent with the ten elements of aging management program XI.M5, "BWR Feedwater Nozzle," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the BWR Feedwater Nozzle program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. A review of the industry operating experience, as summarized in NUREG-0619, revealed that several BWR plants experienced cracking in the feedwater nozzles and connecting feedwater spargers. Plants designed before 1980 were particularly susceptible. NUREG-0619 provided several recommendations for inspections and design improvements. Important design features that were recommended by NUREG-0619 and incorporated into the nozzle design include eliminating the cladding on the inner surface of the nozzles and the use of low leakage triple thermal sleeves. Also, the feedwater system is designed with a low flow control valve for use during low power operations, and the reactor water cleanup system was designed to return flow to the reactor through both feedwater loops. These design attributes minimize the magnitude and frequency of temperature fluctuations and resulting thermal fatigue, and thereby minimize the likelihood of cracking in the feedwater nozzles.

This example provides objective evidence that industry experience and the guidance within approved industry standards have been incorporated into the plant design to minimize thermal fatigue and the probability of cracking in the feedwater nozzles. The lack of significant indications of cracking in the feedwater nozzles can be attributed in part to implementing the design recommendations defined in NUREG-0619.

2. BWR Owners Group (BWROG) Licensing Topical Report, GE-NE-523-A71-0594-A, Revision 1, “Alternate BWR Feedwater Nozzle Inspection Requirements” provides standard industry guidelines for feedwater nozzle inspection scope, methods and frequency. These recommendations have been incorporated into the existing augmented ISI program and the BWR Feedwater Nozzle program for inspection of the feedwater nozzles.

This example provides objective evidence that industry experience and the guidance within approved industry standards has been incorporated into the existing augmented ISI program for feedwater nozzle inspection to effectively manage the material condition of the feedwater nozzles relative to cracking. Use of industry standard inspection methods provides assurance that inspections will provide timely indication of detection of cracking if it occurs.

3. The feedwater nozzles have been inspected for cracking as part of the existing augmented ISI program in accordance with the guidance in GE-NE-523-A71-0594-A, Revision 1. Each nozzle has been inspected at least twice using UT techniques recommended within GE-NE-523-A71-0594-A, Revision 1. Minor recordable indications were noted and evaluated as acceptable within the software used by the automated UT inspection equipment, consistent with ASME Code, Section XI Article IWB-3000 criteria, during the following inspections of feedwater nozzles:

- The Unit 1 N4A, C, D, E, F feedwater nozzle-to-vessel welds in 2012, during refueling outage L1R14.
- The Unit 2 N4A, D, E feedwater nozzle-to-vessel welds in 2011, during refueling outage L2R13.

In addition, as part of the ISI program, a reactor vessel pressure test is performed during each refueling outage to verify no unacceptable reactor coolant pressure boundary leakage. These pressure tests have not identified any leakage from the feedwater nozzles.

This example provides objective evidence that condition monitoring has been effectively used to manage the aging effects of cracking in the feedwater nozzles using the guidance provided by approved industry standards. This example also illustrates that ISI inspections performed in accordance with the existing augmented ISI program by qualified personnel are capable of detecting minor indications that were determined to be acceptable per ASME Code, Section XI Article IWB-3000 criteria, and therefore would identify more significant unacceptable conditions that challenge the intended functions of the feedwater nozzles.

The operating experience relative to the BWR Feedwater Nozzle program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the BWR Feedwater Nozzle program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the BWR Feedwater Nozzle program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing BWR Feedwater Nozzle program provides reasonable assurance that the cracking aging effect is adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.6 BWR Control Rod Drive Return Line Nozzle

Program Description

The BWR Control Rod Drive Return Line (CRDRL) Nozzle aging management program is an existing condition monitoring program that manages the aging effect of cracking in the CRDRL reactor pressure vessel nozzle. The CRDRL nozzle is exposed to a reactor coolant environment. Modifications were implemented on Units 1 and 2 per the recommendations of NUREG-0619 to mitigate cracking due to thermal fatigue. The CRDRL nozzle was capped and the CRD return line to the reactor vessel was removed and not rerouted as part of the original plant design. Therefore, augmented inspections required by NUREG-0619 are not applicable. The program performs inservice inspections (ISI) to monitor the effects of cracking of the CRDRL nozzle.

The CRDRL nozzle blend radius and nozzle-to-vessel weld examinations are performed at the frequency specified in ASME Code, Section XI, Subsection IWB, Table IWB-2500-1. The CRDRL nozzle-to-cap weld examinations are performed at a frequency specified by the BWR Stress Corrosion Cracking (B.2.1.7) program that implements commitments from NRC Generic Letter 88-01 and BWRVIP-75-A. ISI examinations include volumetric ultrasonic test (UT) examination of the CRDRL nozzles including the nozzle-to-vessel weld, nozzle blend radius, and nozzle-to-cap welds. The nozzle, cap and associated welds are included in the visual inspection (VT-2) during the reactor pressure test performed each refueling outage.

Procedures require use of ASME Code, Section XI for evaluating flaw indications. Flaw indications are evaluated in accordance with the guidelines of ASME Section XI, IWB-3100, using the acceptance standards of IWB-3500 as directed by IWB-3410 and Table IWB-2500-1. Flaws that do not meet the acceptance criteria in IWB-3500 may be evaluated analytically per IWB-3600 criteria. Repair and replacement would be performed consistent with the requirements of ASME Section XI, IWA-4000.

NUREG-1801 Consistency

The BWR Control Rod Drive Return Line Nozzle aging management program is consistent with the ten elements of aging management program XI.M6, "BWR Control Rod Drive Return Line Nozzle," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the BWR Control Rod Drive Return Line Nozzle program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. A review of the operating experience reveals that cracking in the CRDRL nozzle has occurred in several BWR plants as described in NUREG-0619 and Information Notice 2004-08. Plants placed in operation before 1980 were especially susceptible. In response to the concerns described in NUREG-0619, the use of a CRD return line to the reactor vessel was eliminated and the CRDRL nozzle was capped on both units prior to reactor power operations. These design improvements significantly reduce thermal fatigue and the likelihood of cracking in the nozzle. The CRDRL nozzles on Units 1 and 2 have been examined several times with no flaws detected.

This example illustrates how industry operating experience and best practices relative to plant and nozzle design was implemented to minimize the probability of cracking in this nozzle. The lack of indications identified during subsequent examinations can be attributed in part to implementing the design recommendations defined in NUREG-0619.

2. UT examinations of the Unit 1 and Unit 2 CRDRL nozzle blend radius, nozzle-to-vessel weld, and nozzle-to-cap weld have been periodically conducted in accordance with ASME Section XI, Table IWB-2500-1. The most recent examinations of the nozzle blend radius, nozzle-to-vessel weld, and nozzle-to-cap weld were performed in 2010 on Unit 1. On Unit 2, the most recent examinations of the nozzle blend radius and nozzle-to-vessel weld were performed in 2009, and the most recent examination of the nozzle-to-cap weld was performed in 1999. There were no indications of cracking discovered during any of these inspections. In addition, as part of the ISI program, a reactor vessel pressure test and visual inspection (VT-2) is performed during each refueling outage to verify no unacceptable reactor coolant pressure boundary leakage. The inspection includes the CRDRL nozzle, cap, and associated welds. These pressure tests have not identified any leakage from the CRDRL nozzle.

This example illustrates how best industry practices relative to UT examination methods and an effective ISI program are being implemented to verify that cracking is not initiating at these nozzles or associated components, that their material condition is good and is being effectively managed.

3. In response to BWR operating experience of IGSCC occurring in susceptible welds within the reactor coolant pressure boundary, Mechanical Stress Improvement Process (MSIP) was performed on the CRDRL nozzle-to-cap weld on Unit 1 after more than two years of operation, and on Unit 2 within two years of operation. Performing stress improvement via the MSIP process was later recommended within NRC GL 88-01 as an effective measure to provide resistance to IGSCC at susceptible welds.

This example illustrates how use of operating experience and promptly implementing best industry practices minimized the probability of cracking in the CRDRL nozzle-to-cap welds. The lack of indications identified during subsequent examinations can be attributed in part to implementing stress improvement on these welds.

The operating experience relative to the BWR Control Rod Drive Return Line Nozzle program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the BWR Control Rod Drive Return Line Nozzle program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing BWR Control Rod Drive Return Line Nozzle program provides reasonable assurance that the cracking aging effect is adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.7 BWR Stress Corrosion Cracking

Program Description

The BWR Stress Corrosion Cracking aging management program is an existing condition monitoring and mitigative program that manages intergranular stress corrosion cracking (IGSCC) in relevant piping and piping welds made of stainless steel and nickel based alloy in reactor coolant and treated water environments. The program implements the program delineated in NUREG-0313, Revision 2, and NRC Generic Letter (GL) 88-01 and its Supplement 1. The program includes preventive measures to mitigate IGSCC, and inspection and flaw evaluation to monitor IGSCC and its effects.

Reactor coolant water chemistry is controlled and monitored in accordance with EPRI guidelines to maintain high water purity and reduce susceptibility to SCC or IGSCC as described in the Water Chemistry (B.2.1.2) program. Induction Heating Stress Improvement (IHSI) or Mechanical Stress Improvement Process (MSIP) has been performed to reduce the effects of cracking on all except two welds determined to be susceptible to IGSCC. Hydrogen Water Chemistry and Noble Metals Chemical Addition have been implemented to further reduce susceptibility of the piping systems exposed to reactor coolant to SCC or IGSCC.

The program addresses the management of crack initiation and growth due to IGSCC in the piping, welds, and components exposed to a reactor coolant environment through the implementation of the ISI program in accordance with ASME Code, Section XI. Inservice inspections, performed as augmented requirements of the Section XI ISI program ensure that aging effects are identified and repaired before the loss of intended function of the components. The current inspection frequency for welds classified as Category B through G per NRC GL 88-01 is per the recommendations provided in the staff-approved BWRVIP-75-A, “BWR Vessel and Internals Project Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules” for normal water chemistry conditions. Welds classified as Category A are subsumed into the Risk-Informed Inservice Inspection (RI-ISI) program in accordance with staff-approved EPRI Topical Report TR-112657, Revision B-A, Final Report, “Revised Risk-Informed Inservice Inspection Evaluation Procedure,” December 1999.

Inspection and flaw evaluation is conducted in accordance with the ISI program plan. When a flaw exceeds the applicable acceptance standards of IWB-3500 an analytical evaluation may be performed in accordance with IWB-3600 to determine its acceptability for continued service without repair or replacement. Evaluations are performed using the applicable crack growth rate provided by ASME Code, Section XI. BWRVIP-14-A, BWRVIP-59-A, BWRVIP-60-A, and BWRVIP-62 also provide approved guidelines that can be used for evaluating crack growth in stainless, nickel alloys, and low-alloy steels. In accordance with NRC GL 88-01, an evaluation performed to accept an IGSCC flaw must be approved by the NRC before resumption of operation.

The guidance for replacement, weld overlay repair, and stress improvement is provided in several industry documents, including NRC GL 88-01, NUREG-0313, Revision 2, ASME Code, Section XI, Subsection IWA-4000, and approved code cases.

NUREG-1801 Consistency

The BWR Stress Corrosion Cracking aging management program is consistent with the ten elements of aging management program XI.M7, "BWR Stress Corrosion Cracking," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the BWR Stress Corrosion Cracking program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. NRC GL 88-01 and NUREG-0313, Revision 2 provided recommendations to perform stress improvement processes including IHSI or MSIP on welds that were susceptible to stress corrosion cracking to reduce the tensile stresses and the susceptibility for cracking. IHSI or MSIP was performed on all Unit 1 welds and all except two Unit 2 welds that are within the scope of the NRC GL 88-01 augmented ISI program. The stress improvements were applied to most of the welds prior to two years of operation.

This example illustrates how industry operating experience was effectively used to apply IHSI or MSIP to minimize the probability of cracking in welds determined to be most susceptible to stress corrosion cracking. The lack of cracking indications in welds within the scope of the program can be attributed in part to the stress improvement applied to the welds.

2. The augmented ISI program for stress corrosion cracking examinations put in place to meet NRC GL 88-01 and NUREG-0313 guidelines has been in place since 1988. In 1986, two welds on Unit 1, that were later within the scope of NRC GL 88-01, had flaws identified. In 1990, the crowns on these welds were machined and subsequent volumetric examination characterized these as root geometry indications, not IGSCC cracks. There are currently no welds within the scope of the BWR Stress Corrosion Cracking program that have IGSCC cracks.

This example illustrates how implementation of industry operating experience from NRC GL 88-01 and volumetric examination was applied to identify minor indications in welds within the scope of the program. This example also demonstrates how the industry guidelines per NRC GL 88-01, NUREG-0313, Revision 2, and BWRVIP-75-A are effectively applied to classify a weld with cracking indication and appropriately schedule and perform examinations to verify the condition of the weld is acceptable for continued service.

3. During the Unit 1 refueling outage in 2012, volumetric examinations were performed on nine welds within the scope of the BWR Stress Corrosion Cracking program. No indications of cracking were identified. During the Unit 2 refueling outage in 2013, volumetric examinations were performed on 13 welds within the scope of the BWR Stress Corrosion Cracking program. No indications of cracking were identified. For welds classified as Category B through D, examinations were performed per the schedules within BWRVIP-75-A. The weld examinations for Category A welds were performed per Risk-Informed ISI program schedules.

This example illustrates how the industry guidelines per NRC GL 88-01, NUREG-0313, Revision 2, and BWRVIP-75-A continue to be effectively applied to monitor the condition of welds within the scope of the program.

The operating experience relative to the BWR Stress Corrosion Cracking program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the BWR Stress Corrosion Cracking program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing BWR Stress Corrosion Cracking program provides reasonable assurance that the cracking aging effect is adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.8 BWR Penetrations

Program Description

The BWR Penetrations aging management program is an existing condition monitoring program that manages the aging effect of cracking of the reactor vessel instrumentation penetrations, control rod drive (CRD) housing and incore-monitoring housing (ICMH) penetrations, and the standby liquid control (SLC)/Core Plate differential pressure (dP) penetration exposed to a reactor coolant environment. The program is implemented through station procedures that provide for mitigation of cracking through management of water chemistry and condition monitoring through examinations of reactor vessel penetration welds.

In addition to the requirements of ASME Code, Section XI, Subsection IWB, the BWR Penetrations program incorporates the inspection and evaluation recommendations of BWRVIP-49-A, "Instrument Penetration Inspection and Flaw Evaluation Guidelines," BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," BWRVIP-27-A, "BWR Standby Liquid Control System/Core Plate dP Inspection and Flaw Evaluation Guidelines," and the recommendations for reactor water chemistry as described in the Water Chemistry (B.2.1.2) program.

The BWR Penetrations program monitors the effects of SCC and IGSCC by requiring inspections of the instrumentation penetrations, CRD housing and ICMH penetrations, and SLC/Core Plate dP penetration as part of the ISI program per the requirements of ASME Code, Section XI, Table IWB-2500-1, a relief request to use BWRVIP guidance in lieu of ASME Code requirements, and BWRVIP reports. A description of the ISI program, including the controlling edition of ASME Code, Section XI, is provided in the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program. During each refueling outage, a visual inspection (VT-2) of the instrumentation penetrations, CRD housing and ICMH penetrations, and SLC/Core Plate dP penetration is performed during the reactor coolant pressure boundary system leakage test.

When the reactor vessel lower plenum area is accessible during normal reactor refueling activities, visual inspections are performed to the extent practical per BWRVIP-47-A guidelines. Inspections are performed in accordance with the guidelines of BWRVIP-49-A for the instrument penetrations, BWRVIP-47-A for the CRD housing and ICMH housing penetrations, and BWRVIP-27-A for the SLC/Core Plate dP penetration. The guidelines of BWRVIP-49-A, BWRVIP-47-A, and BWRVIP-27-A provide information on the type of penetrations, evaluate their susceptibility and consequences of failure, and define the inspection strategy to assure safe operation.

NUREG-1801 Consistency

The BWR Penetrations aging management program is consistent with the ten elements of aging management program XI.M8, "BWR Penetrations," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the BWR Penetrations program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. During the Unit 1 refueling outages in 1999 and 2002, the baseline inspections of the lower plenum components that are required by BWRVIP-47-A were completed with no recordable indications identified. Control rod drive tube sleeve to alignment pin lug welds (CRGT-1) and alignment pin to core plate welds (FS/GT-ARPIN-1) were inspected using VT-3 method. Control rod drive guide tube body to sleeve welds (CRGT-2) and guide tube base to body welds (CRGT-3) were inspected using EVT-1 method.

This example provides objective evidence that the baseline inspections required by BWRVIP-47-A were implemented by the BWR Penetrations program using the methods recommended to identify cracking per the required inspection schedule. No cracking or other material condition issues were identified.

2. During the Unit 2 refueling outages in 2000 and 2003, the baseline inspections of the lower plenum components that are required by BWRVIP-47-A were completed with no recordable indications identified. Control rod drive tube sleeve to alignment pin lug welds (CRGT-1) and alignment pin to core plate welds (FS/GT-ARPIN-1) were inspected using VT-3 method. Control rod drive guide tube body to sleeve welds (CRGT-2) and guide tube base to body welds (CRGT-3) were inspected using EVT-1 method.

This example provides objective evidence that the baseline inspections required by BWRVIP-47-A were implemented by the BWR Penetrations program using the methods recommended to identify cracking per the required inspection schedule. No cracking or other material condition issues were identified.

3. During the Unit 1 refueling outage in 2008 and the Unit 2 refueling outage in 2007, the SLC/Core Plate dP penetration to safe end extension welds were inspected using ultrasonic examination with no recordable indications identified.

This example provides objective evidence that the inspections required by BWRVIP-27-A are being implemented by the BWR Penetrations program using the methods recommended to identify cracking per the required inspection schedule and frequency. No cracking or other material condition issues were identified.

4. During the Unit 1 refueling outage in 2012 and Unit 2 refueling outage in 2013, the instrumentation penetrations, CRD housing and ICMH penetrations, and the SLC/Core Plate dP penetration were inspected using VT-2 method during the reactor coolant pressure boundary system leakage test with no leakage identified from these components.

This example provides objective evidence that the BWR Penetrations program includes use of visual examination techniques per applicable BWRVIP Reports and ASME Code, Section XI requirements to verify that there has been no loss of pressure boundary function for the components within the scope of the program.

The operating experience relative to the BWR Penetrations program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the BWR Penetrations program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing BWR Penetrations program provides reasonable assurance that the cracking aging effect is adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.9 BWR Vessel Internals

Program Description

The BWR Vessel Internals aging management program is an existing condition monitoring and mitigative program that manages aging of the reactor vessel internals in accordance with the requirements of ASME Code, Section XI and Boiling Water Reactor Vessel and Internals Project (BWRVIP) reports. The program manages the aging effects of cracking, loss of material, and loss of fracture toughness of vessel internal components in a reactor coolant environment. The program includes inspection and flaw evaluation in conformance with the guidelines of applicable BWRVIP reports and ASME Code, Section XI. The program also mitigates these aging effects by managing water chemistry per the Water Chemistry (B.2.1.2) program. The BWR Vessel Internals program includes periodic inspections of components fabricated from X-750 material to provide for timely identification of cracks that may be indicative of degradation due to thermal aging and neutron irradiation embrittlement. Precipitation-hardened (PH) martensitic stainless steel (e.g., 15-5 and 17-4 PH steel), and martensitic stainless steel (e.g., Type 403, 410, 431 steel) are not used within the reactor vessel internal components.

The program will be enhanced to manage the effects of loss of fracture toughness due to thermal aging and neutron irradiation embrittlement for reactor vessel internal components fabricated from Cast Austenitic Stainless Steel (CASS). CASS components that are exposed to neutron fluence greater than $1x10^{17}$ n/cm^2 (E > 1Mev) are susceptible to neutron embrittlement. CASS components will be screened for susceptibility to thermal aging on the basis of casting method, molybdenum content, and percent ferrite in accordance with the criteria set forth in the May 19, 2000 letter from Christopher Grimes, Nuclear Regulatory Commission (NRC), to Mr. Douglas Walters, Nuclear Energy Institute. If casting method, ferrite or molybdenum content cannot be determined for any CASS components, they will be assumed to be susceptible to thermal aging for the purposes of determining program examination requirements.

The BWR Vessel Internals program includes commitments to the following BWRVIP guidelines for inspection, evaluation, and repair recommendations for the components listed. If a new or revised BWRVIP guideline approves a less conservative requirement than the staff-approved version, the more restrictive requirement is followed until the staff approves the revised guideline.

Core Shroud: Inspections and flaw evaluations are performed in accordance with BWRVIP-76-A. The repair design criteria in BWRVIP-02-A would be utilized in preparing a repair plan for the core shroud.

Core Plate: Inspections and flaw evaluations are performed in accordance with BWRVIP-25. The repair design criteria in BWRVIP-50-A would be utilized in preparing a repair plan for the core plate.

Core Spray: Inspections and evaluations are performed in accordance with BWRVIP-18-R1-A. The repair design criteria in BWRVIP-16-A and BWRVIP-19-A would be utilized in preparing a repair plan for the core plate.

Shroud Support: Inspections and evaluations are performed in accordance with BWRVIP-38. The repair design criteria in BWRVIP-52-A would be utilized in preparing a repair plan for the core shroud support.

Jet Pump Assembly: Inspections and evaluations are performed in accordance with BWRVIP-41, Revision 3. The repair design criteria in BWRVIP-51-A would be utilized in preparing a repair plan for jet pump components.

LPCI Coupling: Inspections and flaw evaluations are performed in accordance with BWRVIP-42-A. The repair design criteria in BWRVIP-56-A would be utilized in preparing a repair plan for the LPCI coupling.

Top Guide: Inspections and evaluations are performed in accordance with BWRVIP-26-A and BWRVIP-183. Inspections are performed using EVT-1 methods and may be performed by UT once it becomes available. LaSalle Units 1 and 2 are committed to the inspection of guide grid beams in accordance with BWRVIP-183, and this inspection schedule will continue through the period of extended operation. The repair design criteria in BWRVIP-50-A would be utilized in preparing a repair plan for the top guide.

Control Rod Drive Housings: Inspections and evaluations were performed in accordance with BWRVIP-47-A. The repair design criteria in BWRVIP-55-A and BWRVIP-58-A would be utilized in preparing a repair plan for control rod drive housings.

Lower Plenum: When accessible, inspections and evaluations are performed in accordance with BWRVIP-47-A. The repair design criteria in BWRVIP-55-A would be utilized in preparing a repair plan for penetrations in the lower plenum. BWRVIP 57-A would be utilized in preparing a repair plan for instrument penetrations.

Steam Dryer: Inspections and evaluations are performed in accordance with BWRVIP-139-A. The repair design criteria in BWRVIP-181-A would be utilized in preparing a repair plan for the steam dryer.

The BWR Vessel Internals program specifies the necessary examinations to be performed during each outage based on the BWRVIP guidelines. BWRVIP-03 specifies VT-1 and EVT-1 examinations to detect surface discontinuities and imperfections such as cracks. Volumetric examinations are performed as specified by BWRVIP guidelines. VT-3 examinations are specified to determine the general condition of components by verifying parameters, such as clearances and displacements, and by detecting discontinuities and imperfections, such as loss of integrity of bolted or welded connections, or loose or missing parts, debris, corrosion, wear, or erosion. The examination procedures also identify the type and location of examination required for each component, as well as the basis for the examination.

The program allows for deviation from BWRVIP examination recommendations based on the requirements of NEI-03-08. Any relief request from the requirements of ASME Code, Section XI is submitted to the NRC for approval in accordance with 10 CFR 50.55a.

Evaluation of indications or flaws identified by examination is conducted consistent with the applicable and approved BWRVIP guideline or ASME Code, Section XI, as appropriate for the affected component. Additional general guidelines per BWRVIP-14-A, BWRVIP-59-A, and BWRVIP-60-A are applied for flaw evaluation of crack growth in stainless steels, nickel alloys, and low-alloy steels. Repair and replacement activities, if needed, are performed in accordance with ASME Code, Section XI requirements for code components, consistent with the recommendations of the appropriate BWRVIP repair and replacement guidelines. For nickel alloy repairs, BWRVIP-44-A would be used for weld repairs of irradiated structural components.

BWRVIP License Renewal Applicant Action Items listed in the NRC Safety Evaluation Reports for BWRVIP reports are addressed in Appendix C.

NUREG-1801 Consistency

The BWR Vessel Internals aging management program will be consistent with the ten elements of aging management program XI.M9 “BWR Vessel Internals,” specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Perform an assessment of the susceptibility of reactor vessel internal components fabricated from CASS to loss of fracture toughness due to thermal aging embrittlement. If material properties cannot be determined to perform the screening, they will be assumed susceptible to thermal aging for the purposes of determining program examination requirements. **Program Elements Affected: Scope of Program (Element 1) and Acceptance Criteria (Element 6)**

2. Perform an assessment of the susceptibility of reactor vessel internal components fabricated from CASS to loss of fracture toughness due to neutron irradiation embrittlement. **Program Element Affected: Scope of Program (Element 1)**

3. Specify the required periodic inspection of CASS components determined to be susceptible to loss of fracture toughness due to thermal aging and neutron irradiation embrittlement. The initial inspection will be performed either prior to or within five years after entering the period of extended operation. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), and Acceptance Criteria (Element 6)**

Operating Experience

The following examples of operating experience provide objective evidence that the BWR Vessel Internals program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. The LaSalle shrouds include eight horizontal welds including two, H4 and H5, that are within the beltline; while the BWRVIP nomenclature includes 6 horizontal welds, with one (H4) within the beltline. Therefore, the LaSalle weld nomenclature differs from the BWRVIP; H6 is BWRVIP weld H5, and H8 is BWRVIP weld H7. In 1996, the Unit 1 shroud welds H3, H4, H5, H6 and H8 were inspected using volumetric examination. The H4 weld had approximately 3 percent cracking and the other welds had no indications, resulting in a 10-year re-inspection schedule for welds H3, H4, H6 and H8, and a 20-year reinspection schedule for H5 per BWRVIP guidance. In 2006, H4 had 3 percent cracking and welds H3, H6 and H8 all had between 0.8 and 6.4 percent cracking and a corrective action program issue report was initiated to document evaluation of the condition. In 2012, welds H3, H5, H6 and H8 all had less than 2 percent cracking and a corrective action program issue report was initiated to document evaluation of the condition. Based on the current guidance in BWRVIP-76, no examinations are required for a second beltline weld while the shroud remains classified as Category B, therefore no future examinations of weld H5 are scheduled. Welds H3, H4, H6 and H8 are scheduled for re-inspection in 2022.

In 1995, the Unit 2 shroud welds H3, H4, H5, H6 and H8 were inspected using volumetric examination and had no indications. Since the coverage of welds H5, H6 and H8 was low, they were re-inspected in 1996 and had no indications. In 2005, welds H3, H5, H6 and H8 were re-inspected and had no indications. All the welds except H4 and H5 are scheduled for re-inspection in 2015; H4 is scheduled for re-inspection in 2025.

This example demonstrates that shroud inspections are being performed in accordance with BWRVIP guidelines and that the shrouds on both units are in excellent material condition. This example also demonstrates that the corrective action program is used effectively to identify and evaluate conditions adverse to quality.

2. In 2004, all the Unit 1 jet pump riser brace RS-8 and RS-9 welds were visually inspected and indications were noted at the RS-9 welds on the jet pump 5 and 6 sections of the jet pump 5/6 riser brace, and one indication was noted on the jet pump 9 side of the jet pump 9/10 riser brace. As a result, a corrective action program issue report was initiated and a clamp was installed at the slip joint on all 20 jet pumps. In 2006, the indications at the RS-9 welds for jet pumps 5, 6 and 9 were re-sized with no significant growth identified. Riser brace clamps were installed on the risers of the 5/6 and 9/10 jet pump assemblies and the hold down beams on jet pumps 5, 6, 9 and 10 were proactively replaced. In 2010, the indications at the RS-9 welds on jet pump risers 5/6 and 9/10 were inspected and there was no apparent change. In 2012, the indications at the RS-9 welds on jet pump risers 5/6 and 9/10 were

inspected, and there was no apparent change. The remaining eight RS-9 locations were inspected, and new indications were identified at the RS-9 location on the jet pump 1 section of the jet pump 1/2 riser brace, the jet pump 3 and 4 sections of the jet pump 3/4 jet pump brace, and the jet pump 12 section of the jet pump 11/12 riser brace. A corrective action program issue report was initiated and the condition was evaluated as acceptable for one operating cycle.

The Unit 2 RS-9 welds were inspected in 2005 and in 2011 and no indications were identified. The BWR Vessel Internals program currently includes guidance to evaluate the need to inspect the RS-9 welds on both units each refueling outage.

This example demonstrates that inspections of jet pump components are being performed in accordance with BWRVIP guidelines and that those inspections are effective in identifying cracking indications prior to loss of intended function. This example also demonstrates that the corrective action program is used effectively to identify and evaluate conditions adverse to quality, and to implement corrective actions to monitor, trend and correct the condition.

3. In 1996, all the Unit 2 jet pump riser RS-1 welds were visually inspected and indications were noted at the RS-1B weld on the jet pump 1/2 riser, and at the RS-1C weld on the jet pump 19/20 riser. The conditions were evaluated as acceptable for two operating cycles. Since the seventh refueling outage lasted from September 1996 until April 1999, the two cycles ended in 2003. In 2003, the RS-1 weld on jet pumps 1/2 and 19/20 risers were inspected and the previously identified indications at the RS-1B weld on the jet pump 1/2 riser were determined to not be recordable indications as a result of improved examination techniques. The indication at the RS-1C weld was measured and evaluated as acceptable for two operating cycles. This indication was inspected in 2005, 2007, 2009, and 2013 and no notable change was observed. The current evaluation determined that the condition is acceptable for two operating cycles. All of the other Unit 2 RS-1 welds had been most recently inspected in 2009 or 2011 with no recordable indications. All the Unit 1 RS-1 welds were inspected in 2004, four were inspected in 2010, and three were inspected in 2012, with no recordable indications.

This example demonstrates that inspections of jet pump components are being performed in accordance with BWRVIP guidelines and that those inspections are effective in identifying cracking indications prior to loss of intended function. This example also demonstrates that the corrective action program is used effectively to identify and evaluate conditions adverse to quality, and to implement corrective actions to monitor, trend and correct the condition.

4. In 2003, all 20 Unit 2 jet pump holddown beams were inspected using volumetric examination and three beams had recordable indications. A corrective action program issue report was initiated and the beams were replaced. In 2005, the other 17 Unit 2 jet pump holddown beams were replaced. In 2004, all 20 Unit 1 jet pump holddown beams were inspected using volumetric examination and one beam had a recordable indication. A corrective action program issue report was initiated and the beam was

replaced. In 2008, 14 Unit 1 jet pump holddown beams were inspected and one beam had a recordable indication. A corrective action program issue report was initiated and the beam was replaced. The jet pump holddown beams continue to be examined periodically in accordance with the most current BWRVIP guidelines.

This example demonstrates that inspections of jet pump components are being performed in accordance with BWRVIP guidelines and that those inspections are effective in identifying cracking indications prior to loss of intended function. This example also demonstrates that the corrective action program is used effectively to identify and evaluate conditions adverse to quality, and to implement corrective actions to correct the condition.

5. In 2004, Unit 1 accessible core spray piping welds internal to the reactor vessel were inspected using volumetric examination and three welds had a total of five recordable indications. A corrective action program issue report was initiated and the condition was evaluated as acceptable for one operating cycle. These welds were inspected in 2006 with no notable change identified. These welds were inspected in 2008 and the indications at two of the welds were re-classified as geometric reflectors. The indication at weld BP4a was re-sized and evaluated as acceptable for two operating cycles. Inspection of weld BP4a in 2012 and 2014 indicated no notable change and evaluated the condition as acceptable for two operating cycles.

The Unit 2 accessible core spray piping welds internal to the reactor vessel have been inspected using volumetric examination and no indications have been recorded.

This example demonstrates that inspections of core spray piping components are being performed in accordance with BWRVIP guidelines and that those inspections are effective in identifying cracking indications prior to loss of intended function. This example also demonstrates that the corrective action program is used effectively to identify and evaluate conditions adverse to quality and to monitor and trend the condition.

The operating experience relative to the BWR Vessel Internals program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the BWR Vessel Internals program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the enhanced BWR Vessel Internals program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced BWR Vessel Internals program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.10 Flow-Accelerated Corrosion

Program Description

The Flow-Accelerated Corrosion (FAC) program is an existing condition monitoring program based on the Electric Power Research Institute (EPRI) guidelines in the Nuclear Safety Analysis Center (NSAC)-202L-R3 that includes prediction, detection, and monitoring of wall thinning due to flow-accelerated corrosion and erosion in piping and components in reactor coolant, steam, and treated water environments. The FAC program manages prediction of the amount of wall thinning through analytical evaluations and periodic examinations of locations most susceptible to FAC induced loss of material. Specifically, the program includes:

- analyses to determine critical locations,
- baseline inspections to determine the extent of thinning at these locations, and
- followup inspections to confirm the predictions. Repairs and replacements are performed as necessary.

The FAC program also manages wall thinning caused by mechanisms other than FAC, such as cavitation, flashing, droplet impingement, and solid particle impingement, when periodic monitoring is used in lieu of eliminating the cause of these various erosion mechanisms.

NUREG-1801 Consistency

The Flow-Accelerated Corrosion aging management program is consistent with the ten elements of aging management program XI.M17, "Flow-Accelerated Corrosion," specified in NUREG-1801, as modified by LR-ISG-2012-01.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Flow-Accelerated Corrosion program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. During the spring of 2013, 97 FAC inspections were completed on Unit 2. Components inspected included piping, feedwater heater nozzles, and feedwater heater shells. One of the feedwater heater inspections was a baseline inspection performed on a repaired feedwater heater shell. All 97 of

the components inspected met acceptance criteria.

This example provides objective evidence that the FAC aging management program effectively monitors the aging effects of FAC on piping and components. In addition, the program takes corrective actions, such as component repairs, prior to the loss of function and performs baseline inspections to determine the effectiveness of repair activities.

2. In October of 2013, the oxygen injection into the Unit 2 condensate system was shutdown to support maintenance activities on the turbine building ventilation system. As a result, dissolved oxygen concentrations in the feedwater system fell below 30 ppb. A corrective action program issue report was initiated. In response to this, chemistry contacted the FAC Program Owner to evaluate the impact of reduced oxygen on wear rates. The FAC Program Owner concluded that there was no impact on wear rates due to the short duration of the oxygen injection system shutdown.

This example provides objective evidence that water chemistry changes that may affect FAC wear rates are evaluated by the FAC Program Owner.

3. A Focused Area Self-Assessment (FASA) for the FAC Program was conducted in November 2012. The purpose of the FASA was to verify that the FAC Program is meeting all industry requirements and applying best practices to identify, monitor and mitigate FAC-related damage. The FASA concluded that the FAC program is being satisfactorily executed and is meeting all industry requirements and applying best practices to identify, monitor, and mitigate FAC-related damage in advance of a failure. Three performance improvement recommendations were made by the assessment team to enhance the quality of the FAC program. Two program inadequacies were identified by the assessment team. Actions were assigned to track implementation of the improvement recommendations. New issue reports were generated to capture and evaluate the identified program inadequacies in the corrective action program. All actions were completed and required changes to the program implemented.

The example provides objective evidence that the FAC Program Owner critically self-assesses program performance and self-identifies actions that support continuous improvement.

4. In April of 2013, through-wall leaks were identified in the first elbow located downstream of the minimum flow line orifice in the Unit 2 high pressure core spray (HPCS) system. A corrective action program issue report was initiated. Based on flow modeling and visual inspection of the piping section, it was concluded that the cause of the pipe leak was a combination of cavitation and mechanical wear/erosion. Piping design and extended operation of the system in the minimum flow configuration were identified as being the contributing factors to this failure. Corrective actions were established and included:

- Replacing the affected elbow on Unit 2.

- Performing extent of condition UT inspections of piping and elbows downstream of the min-flow orifices on both Unit 1 and Unit 2 HPCS min-flow lines.
- Creating a work order to replace the Unit 1 HPCS elbow.
- Creating recurring tasks to perform UT of the first elbow after quarterly HPCS pump runs.
- Establishing system monitoring trending of HPCS min-flow runtime and piping wall thickness.
- Evaluating a modification to install multi-stage orifice to eliminate high jet velocities and cavitation.
- Providing guidance in operating procedures for minimizing operation of the system in min-flow and changing operator lesson plans to incorporate guidance for minimizing operation in min-flow.

This example provides objective evidence that wall thinning due to erosion is identified, entered into the corrective action program, effectively monitored, trended, and mitigated to ensure that component intended functions are maintained.

The operating experience relative to the Flow-Accelerated Corrosion program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including wall thinning. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Flow-Accelerated Corrosion program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the Flow-Accelerated Corrosion program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing Flow-Accelerated Corrosion program provides reasonable assurance that the wall thinning aging effect is adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.11 Bolting Integrity

Program Description

The Bolting Integrity aging management program is an existing condition monitoring program that manages the aging effects of cracking, loss of material, and loss of preload on closure bolting for pressure-retaining components within the scope of license renewal. The program utilizes recommendations and guidelines delineated in NUREG-1339, EPRI NP-5769, and EPRI TR-104213 for material selection, use of approved lubricants, proper torqueing, and leakage evaluations which are implemented during plant surveillance and maintenance activities. Aging management reviews have determined that high strength bolting material with actual yield strength of 150 ksi or greater is used for component pressure-retaining bolted joints within the scope of license renewal.

The Bolting Integrity program activities provide for aging management of closure bolting on pressure-retaining bolted joints for piping and components within the scope of license renewal. The program includes periodic inspection, at least once per refueling cycle, of pressure-retaining bolted joints for indication of loss of preload, cracking, and loss of material due to corrosion. The program also credits visual inspection of pressure-retaining bolted joints in ASME Class 1, 2, and 3 systems for leakage and age-related degradation during system pressure tests performed in accordance with ASME Section XI. In addition, the Bolting Integrity program credits volumetric, surface, and visual inspections of ASME Section XI Class 1, 2, and 3 bolts, nuts, washers, and other associated bolting components performed in accordance with Subsections IWB, IWC, and IWD. The integrity of non-ASME pressure-retaining bolted joints (in non-ASME Class 1, 2, 3, and MC systems) is evaluated by detection of visible leakage, evidence of past leakage, or other age-related degradation during walkdowns and maintenance activities.

The Bolting Integrity program includes preventive measures to preclude or minimize loss of preload and loss of material in pressure-retaining bolted joints and will be enhanced to include preventive measures to preclude or minimize stress corrosion cracking by prohibiting the use of lubricants that contain molybdenum disulfide and minimizing the use of bolting material that has an actual measured yield strength of 150 ksi or greater in portions of systems within the scope of license renewal. Inspection activities for bolting in a submerged environment are performed in conjunction with component maintenance activities.

The Bolting Integrity program is supplemented by ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program, for inspection of safety-related closure bolting on pressure-retaining joints.

The following bolting is not included in the Bolting Integrity program.

- The Primary Containment (MC) pressure-retaining bolting is managed as part of ASME Section XI, Subsection IWE (B.2.1.29) program.

- ASME Class 1, 2, 3, and MC piping and components support bolting, including NSSS component supports, is managed as part of ASME Section XI, Subsection IWF (B.2.1.31) program.

- Structural bolting, other than ASME Class 1, 2, 3, and MC piping and component supports bolting is managed as part of the Structures Monitoring (B.2.1.34) program, and R.G. 1.127 Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program.

- Crane and hoist bolting is managed by Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14) program.

- Heating and ventilation system bolted joints is managed by External Surfaces Monitoring of Mechanical Components (B.2.1.24) program.

- Inspection activities for bolting in a buried environment or underground with restricted access are performed in conjunction with buried piping and component inspections performed as part of the Buried and Underground Piping (B.2.1.28) program.

- Reactor head closure bolting is managed by the Reactor Head Closure Stud Bolting (B.2.1.3) program.

NUREG-1801 Consistency

The Bolting Integrity aging management program will be consistent with the ten elements of aging management program XI.M18, "Bolting Integrity," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Provide guidance to ensure proper specification of bolting material, lubricant and sealants, storage, and installation torque or tension to prevent or mitigate degradation and failure of closure bolting for pressure-retaining bolted joints. **Program Elements Affected: Preventive Actions (Element 2), Parameters Monitored/Affected (Element 3), Detection of Aging Effects (Element 4), Corrective Actions (Element 7)**

2. Prohibit the use of lubricants containing molybdenum disulfide on pressure-retaining bolted joints. **Program Elements Affected: Preventive Actions (Element 2), Corrective Actions (Element 7)**

3. Minimize the use of high strength bolting (actual measured yield strength equal to or greater than 150 ksi) for pressure-retaining bolted joints in portions of systems within the scope of the Bolting Integrity program. High strength bolting (regardless of code classification) will be monitored for cracking in accordance with ASME Section XI, Table IWB-2500-1, Examination Category B-G-1. **Program Elements Affected: Preventive Actions (Element 2), Parameters Monitored/Affected (Element 3), Corrective Actions (Element 7)**

4. Perform visual inspection of submerged bolting for the emergency core cooling systems (ECCS) and reactor core isolation cooling (RCIC) system suction strainers in the suppression pool for loss of material and loss of preload during each ISI inspection interval. **Program Elements Affected: Parameters Monitored/Affected (Element 3), Detection of Aging Effects (Element 4)**

5. Perform visual inspection of submerged bolting for the service water diver safety barriers and diesel fire pump suction screens for loss of material and loss of preload during maintenance activities. **Program Elements Affected: Parameters Monitored/Affected (Element 3), Detection of Aging Effects (Element 4)**

6. Perform visual inspection of submerged bolting for the Lake Screen House traveling screens framework for loss of material and loss of preload each refuel interval. **Program Elements Affected: Parameters Monitored/Affected (Element 3), Detection of Aging Effects (Element 4)**

These enhancements will be implemented prior to the period of extended operation.

Operating Experience

The following examples of operating experience provide objective evidence that the Bolting Integrity program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In January 2002, reactor recirculation “A” loop flow control valve was disassembled to perform maintenance on valve internals. During the maintenance activity, one of the 12 studs failed due to over torqueing. This condition was entered into the corrective action program for evaluation. The remaining 11 studs were examined using ultrasonic (UT) and magnetic particle (MT) methods with 10 of the 11 studs found to also have cracking. The examination and metallurgical evaluation of the studs revealed that the cracking existed prior to the over torqueing event. All of the bonnet-to-body studs were replaced. Additional UT examinations were performed on the corresponding “B” loop valve with the studs in place and under tension. No indications of cracking were identified. The corrective actions included examination of the studs for both the Unit 1 and Unit 2 valves, a change to incorporate Belleville washers into the bolted joint design, and enhancements to personnel training and work procedures for the use of hydraulic torque wrenches. This example demonstrates that degraded conditions are entered into the corrective action program, root cause and extent of condition

evaluations are performed, and corrective actions are implemented to prevent recurrence.

2. In February of 2010, corrosion was identified on the bolting and end cover for a cooling water strainer. The corrosion was determined to be caused by a packing leak from the strainer manual backwash valve, which then accumulated at the base of the strainer. The insulation configuration at the bottom of the strainer contributed to the accumulation of the leakage. Corrective actions were taken to rework the bolted joint and replace bolting hardware where necessary. The condition was entered into the corrective action program and evaluated for impact on other strainers. A walkdown of the remaining system strainers was performed and additional corrosion was identified. Engineering evaluation determined that the corrosion was superficial and did not have an impact on the structural integrity of the strainers. Replacement of the system strainers was in progress and includes reconfiguration of strainer insulation to prevent recurrence. Until all of the strainers are replaced, periodic inspections are being performed to identify corrosion and packing leaks so that corrective action can be taken prior to loss of intended function. This example demonstrates an effective use of the corrective action program to identify degraded conditions, identify the root cause of the event and evaluate the event for extent of condition.

3. On January 2003, during ISI inspections, damaged threads were identified on bonnet cover nuts for a reactor recirculation flow control valve. A corrective action program issue report was initiated. The nut was determined to not be suitable for reuse and was replaced. The remaining nuts for the joint were examined for similar damage and none was found. This example identifies the effectiveness of the ASME Section XI program inspections in identifying degraded conditions for bolted pressure boundary joints and taking effective corrective action.

The operating experience relative to the Bolting Integrity program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking, loss of material and loss of preload. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Bolting Integrity program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Bolting Integrity program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Bolting Integrity program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.12 Open-Cycle Cooling Water System

Program Description

The Open-Cycle Cooling Water System (OCCWS) aging management program is an existing preventive, mitigative, condition monitoring, and performance monitoring program that manages heat exchangers, piping, piping elements, and piping components in safety-related and nonsafety-related systems that are exposed to a raw water environment for loss of material and reduction of heat transfer. The activities for this program are consistent with commitments to the requirements of GL 89-13 and provide for management of aging effects in raw water cooling systems through tests, inspections, and component cleaning. System and component testing, visual inspections, non-destructive examination, and biocide and chemical treatment are conducted to ensure that identified aging effects are managed such that system and component intended functions are maintained.

The OCCWS includes those systems that transfer heat from safety-related systems, structures, and components to the ultimate heat sink as defined in GL 89-13 as well as those raw water systems which are in scope for license renewal for potential spatial interaction but have no safety-related heat transfer function.

The guidelines of GL 89-13 are utilized for the surveillance and control of bio-fouling for the OCCWS program. Procedures provide instructions and controls for chemical and biocide injection. Periodic inspections are performed to the presence of Asiatic clams and mollusks, and biocide treatments are applied as necessary.

Periodic heat transfer testing, visual inspection and cleaning of safety-related heat exchangers with a heat transfer intended function are performed in accordance with commitments to GL 89-13 to maintain heat transfer capabilities. Additionally, safety-related piping segments are examined periodically to ensure that there is no significant loss of material which could cause a loss of intended function. Nonsafety-related piping segments that have the potential for spatial interactions with safety-related equipment will be periodically non-destructively examined as delineated in the enhancement described below.

Routine inspections and maintenance ensure that corrosion, erosion, sediment deposition, and bio-fouling do not degrade the performance of safety-related systems. No credit is taken for protective coatings on safety-related components in the OCCWS program in determining potential aging effects. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program (B.2.2.1) activities are adequate for managing the aging effects of the internal surface coating for the OCCWS components.

The Buried and Underground Piping (B.2.1.28) aging management program activities are adequate for managing the aging effects of external surfaces of buried and underground piping and components. The external surfaces of the aboveground raw water piping and heat exchangers are managed by the External Surfaces Monitoring of Mechanical Components (B.2.1.24) aging management program.

Examination of polymeric materials in systems serviced by the OCCWS program will be consistent with examinations prescribed in the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25) aging management program.

LR-ISG-2012-02 has been issued which addresses instances of recurring internal corrosion identified during review of plant-specific operating experience. The operating experience for LSCS has been reviewed and instances of internal corrosion in the OCCWS have been identified with a frequency that is consistent with the thresholds discussed in LR-ISG-2012-02. This operating experience relates to loss of material due to microbiological induced corrosion (MIC) of carbon steel piping in raw water systems. The OCCWS program will be enhanced to perform additional pipe wall thickness examinations for aboveground carbon steel piping in both the safety-related and nonsafety-related system piping to monitor for degradation in the piping. For the buried piping, visual inspections of the piping interior surfaces will be performed whenever the piping internal surface is made accessible due to maintenance and repair activities. In addition, a portion of the aboveground inspection locations will be selected with process conditions similar to those in the buried piping to use as an indicator of the condition of the buried piping.

NUREG-1801 Consistency

The Open-Cycle Cooling Water System aging management program will be consistent with the ten elements of aging management program XI.M20, "Open-Cycle Cooling Water System," specified in NUREG-1801, as modified by LR-ISG-2012-02.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Perform a minimum of 10 microbiologically influenced corrosion (MIC) degradation inspections for aboveground piping in the Essential Cooling Water System every 24 months until the rate of MIC occurrences no longer meets the criteria for recurring internal corrosion. The selected inspection locations will be periodically reviewed to validate their relevance and usefulness and adjusted as appropriate. Evaluation of the inspection results will include; (1) a comparison to the nominal wall thickness or previous wall thickness measurements to determine rate of corrosion degradation; (2) a comparison to

the design minimum allowable wall thickness to determine the acceptability of the component for continued use; and (3) a determination of reinspection interval. A portion of these inspection locations will be selected with process conditions similar (e. g. flow, temperature) to those in buried portions of the piping to provide sufficient understanding of the condition of the buried piping. **Program Elements Affected: Parameters Monitored/Affected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

2. Perform a minimum of 10 MIC degradation inspections for in scope aboveground piping in the Nonessential Cooling Water System every 24 months until the rate of MIC occurrences no longer meets the criteria for recurring internal corrosion. The selected inspection locations will be periodically reviewed to validate their relevance and usefulness and adjusted as appropriate. Evaluation of the inspection results will include (1) a comparison to the nominal wall thickness or previous wall thickness measurements to determine rate of corrosion degradation; (2) a comparison to the design minimum allowable wall thickness to determine the acceptability of the component for continued use; and (3) a determination of reinspection interval. A portion of these inspection locations will be selected with process conditions similar (e. g. flow, temperature) to those in buried portions of the piping to provide sufficient understanding of the condition of the buried piping. **Program Elements Affected: Parameters Monitored/Affected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

3. Select an inspection method that will provide indication of suitable wall thickness to perform inspections on a representative sample of buried piping to supplement the aboveground piping inspection locations. **Program Elements Affected: Parameters Monitored/Affected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

4. Perform visual inspections of the interior surface of buried portions of the Essential Cooling Water System and Nonessential Cooling Water System whenever the piping internal surface is made accessible due to maintenance and repair activities. **Program Elements Affected: Parameters Monitored/Affected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

Operating Experience

The following examples of operating experience provide objective evidence that the Open-Cycle Cooling Water System program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In June 2013, a leak was identified in the Unit 2 residual heat removal (RHR) service water piping near the 2B RHR heat exchanger service water outlet orifice. Immediate actions were taken to contain the leakage to prevent any adverse impact to safety-related equipment in the area, performing UT examinations to characterize the degraded area, performing an operability

evaluation. A temporary reinforcement pad was installed over the degraded area utilizing ASME Code Case N-789 and evaluations performed to confirm the condition was acceptable until the pipe could be replaced at the next outage. The condition was entered into the corrective action program and an apparent cause evaluation was performed attributing the degradation to microbiologically influenced corrosion (MIC). Additional pipe locations were selected for UT examination to support the extent of condition review. This event demonstrates that prompt action is taken when degraded conditions are identified and the corrective action program is effectively used.

2. In November 2012, a common cause evaluation was performed within the corrective action program as the result of operating experience with low flow conditions observed in periodic core standby cooling system equipment cooling water system (CSCS) component surveillance tests. The purpose of the evaluation was to address the low flow test results and identify improvements to address the issue. Industry operating experience was utilized in the evaluation. The evaluation recommended performing more frequent flushing with higher turnover rates to decrease fouling, expanding the chemical cleanout of coolers to include connecting supply and discharge piping, and increasing the strength of chemical concentrations used for silt dispersant and bio-fouling. A tracking activity was created to evaluate the effectiveness of these improvements. This event demonstrates that test results to validate heat transfer capability of safety-related heat exchangers are periodically reviewed and trended to identify adverse trends and that industry operating experience is utilized in these assessments.

3. In April 2011 while performing the periodic UT pipe wall thickness measurements as part of the GL 89-13 program, a degraded location was identified on inlet piping to the 1A RHR seal cooler. The condition was entered into the corrective action program for evaluation. The results from this examination were compared to previous inspection results indicating that the pipe internal surface continues to corrode and will require future replacement. The affected piping was subsequently replaced in August 2011. Based on UT examination results, the degraded area was localized and the wall thickness was above the wall thickness to meet design requirements. Based on this finding, four additional locations were selected for inspection in accordance with site procedures. This event demonstrates the effectiveness of the current GL 89-13 program and use of the corrective action program to implement timely repairs and perform extent of condition examinations.

4. A review of LSCS operating experience has revealed instances of recurring internal corrosion in the Essential Cooling Water System and the Nonessential Cooling Water System piping that is within the scope of the Open-Cycle Cooling Water System aging management program. Inspections will be performed on the carbon steel piping for corrosion and degradation of the piping internal surfaces. These additional inspections meet the guidance provided in LR-ISG-2012-02. This example provides objective evidence that Interim Staff Guidance is reviewed and incorporated into aging management programs.

The operating experience relative to the Open-Cycle Cooling Water System program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of material and reduction of heat transfer. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Open-Cycle Cooling Water System program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the enhanced Open-Cycle Cooling Water System program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Open-Cycle Cooling Water System program will provide reasonable assurance that the loss of material and reduction of heat transfer aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.13 Closed Treated Water Systems

Program Description

The Closed Treated Water Systems aging management program is an existing mitigative and condition monitoring program that manages the loss of material, cracking, and reduction of heat transfer in piping, piping components, piping elements, tanks, and heat exchangers exposed to a closed cycle cooling water environment. The Closed Treated Water Systems program includes (a) nitrite-based water treatment, including pH control and the use of corrosion inhibitors to modify the chemical composition of the water such that the function of the components are maintained and such that the effects of corrosion are minimized; (b) chemical testing of the water to ensure that the water treatment program maintains the water chemistry within acceptable guidelines; and (c) inspections to determine the presence or extent of corrosion, stress corrosion cracking, or fouling.

The Closed Treated Water Systems program activities are implemented through station procedures. Mitigative activities include utilizing nitrite-based chemistry controls to minimize the age-related degradation of components exposed to a closed treated water environment. The performance of sample analyses assures water chemistry parameters are maintained within the goal ranges specified by procedures based on EPRI 1007820, Closed Cooling Water Chemistry Guideline. Monitoring of water chemistry parameters also assures contaminants are kept below applicable limits to prevent or limit corrosion. Condition monitoring activities provide for opportunistic visual inspections whenever the system boundary is opened, as well as new periodic inspections, which are effective in detecting applicable aging effects, and the frequency of condition monitoring is adequate to prevent significant age-related degradation.

The program will be enhanced, as noted below, to provide reasonable assurance that the Closed Treated Water Systems program will manage the aging effects of loss of material, cracking, and reduction of heat transfer during the period of extended operation.

NUREG-1801 Consistency

The Closed Treated Water Systems aging management program will be consistent with the ten elements of aging management program XI.M21A, “Closed Treated Water Systems,” specified in NUREG-1801, as modified by LR-ISG-2012-02.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancement will be implemented in the following program elements:

1. Perform condition monitoring, including periodic visual inspections and non-destructive examinations, to verify the effectiveness of water chemistry control to mitigate aging effects. A representative sample of piping and components will be selected based on likelihood of corrosion, stress corrosion cracking, or fouling, and inspected at an interval not to exceed once in 10 years during the period of extended operation. The selection of components to be inspected will focus on locations which are most susceptible to age-related degradation, where practical. **Program Elements Affected: Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4)**

Operating Experience

The following examples of operating experience provide objective evidence that the Closed Treated Water Systems aging management program will be effective in assuring that intended function are maintained consistent with the current licensing basis for the period of extended operation.

1. In 2003, the Unit 1 primary containment chilled water system experienced decreasing pH levels accompanied with increasing ammonia levels. These chemistry parameters indicated microbiological growth in the closed treated water. A corrective action program issue report was initiated. Three sets of chemical adjustments were made in accordance with closed cooling water chemistry procedures. Specifically, there were biocide (i.e. glutaraldehyde) additions followed up with caustic additions for pH adjustments. In each instance, the chemical additions resulted in restoration of Unit 1 primary containment chilled water system closed treated water chemistry to goal values. After the third set of chemical additions, all chemistry parameters were restored to acceptable levels with no further evidence of microbiological growth in the system. No subsequent chemical additions were required. It was also noted that total aerobic bacteria analysis results were always well within closed cooling water chemistry goal values.

Chemistry personnel assessed the need for multiple chemical additions, and this led Chemistry personnel to conclude that the current biocide being used may not be effective. Based on this conclusion, Chemistry personnel made several corrective action recommendations including the performance of enhanced microbiological sampling and analysis, and the evaluation of alternative biocides. Alternative biocides were evaluated using the EPRI Closed Cooling Water Guideline (TR-107396), INPO Good Practice CY-708 INPO 96-007, Treating and Monitoring Closed Cooling Water Systems, and benchmarking with Quad Cities station. As a result of the evaluation, LaSalle Chemistry personnel identified isothiazolin as an acceptable alternative biocide which is effective against nitrifying and denitrifying bacteria. Although the biocide isothiazolin was not added to the Unit 1 primary containment chilled water system, it was approved for future use.

This operating experience example provides objective evidence that the closed cooling water chemistry program includes sampling, analysis, and trending of closed cooling water chemistry parameters to mitigate age-related degradation, and that potentially adverse conditions are identified and addressed prior to loss of component intended function within the corrective action program.

2. On January 19, 2010, Chemistry sampled and analyzed the Unit 1 turbine building closed cooling water (TBCCW) system. The analysis for nitrite, the mild steel corrosion inhibitor, identified a nitrite concentration of 588 ppm. This nitrite concentration of 588 ppm was below the lower limit of the goal range of 600 ppm to 1500 ppm specified in closed cooling water chemistry procedures. A corrective action program issue report was initiated. Although the nitrite concentration of 588 ppm was below the lower limit of the goal range, the nitrite concentration was not within Action Level 1 or Action Level 2 values. Action Level 1 for nitrite concentration is less than 500 ppm. Action Level 2 for nitrite concentration is less than 300 ppm or greater than 4000 ppm. On January 26, the Unit 1 TBCCW system was resampled and analyzed. The analysis resulted in a nitrite concentration of 546 ppm, once again below the lower limit of the goal range of 600 ppm to 1500 ppm, but the nitrite concentration was not within Action Level 1 or Action Level 2 values.

An investigation was performed and the cause of the decrease in nitrite concentration was attributed to Operations performing frequent water makeup to the Unit 1 TBCCW expansion tank due to a TBCCW leak in the common station air compressor system. The corrective actions for this issue directed Chemistry to perform a chemical addition to restore the Unit 1 TBCCW system back to within system goals, and to repair the TBCCW leak on the common station air compressor. Subsequent to repairs, another chemical addition was made and on February 2, Chemistry sampled and analyzed the Unit 1 TBCCW system. The analysis for nitrite resulted in a nitrite concentration of 1104 ppm which is within the goal range of 600 ppm to 1500 ppm.

This operating experience example provides objective evidence that the closed cooling water chemistry program includes sampling, analysis, and monitoring for age-related degradation, and that potentially adverse conditions are identified and addressed prior to loss of component intended function within the corrective action program.

3. On September 16, 2013, while performing observations in the Chemistry Hot Lab, Nuclear Oversight (NOS) identified a chemical bottle with a past due expiration date. At that time, Chemistry was transitioning from their old Excel-based database to the new Labware software database which has a module for keeping track of chemicals and expiration dates. A corrective action program issue report was initiated. Corrective actions included the proper removal of the chemical by lab personnel, and NOS personnel discussing this issue with Chemistry department management. Another corrective action included the issuance of a supplemental page on the shift orders for reporting the proper handling of expiring chemicals.

In late August 2013, LaSalle had implemented the new LIMS (Laboratory Information System) system with Labware. As part of the LIMS implementation, the new standards and reagent module was activated in the production version of Labware. Labware is a database tool designed to schedule sampling and lab analysis, allow for data entry and review, and provide notifications of exceeding any system limits (goals, limits, and action levels). One feature of the Labware database tool is it has the capability to give instant feedback to members of the Chemistry Department on out-of-specification results. The Labware tool also provides the chemistry technician which procedures are impacted, and automatically notifies the system manager and the Chemistry Manager in the event of out-of-specification results.

This example and the implementation of the Labware database tool at LaSalle, including the new standards and reagent module, provides objective evidence that closed cooling water chemistry program includes assessments that result in continuous improvement to maintain the quality of the program.

The above examples provide objective evidence that the Closed Treated Water Systems program is capable of both monitoring and detecting the aging effects associated with closed treated water environments. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions are taken to prevent recurrence. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the Closed Treated Water Systems program will effectively identify degradation prior to loss of intended function.

Conclusion

The enhanced Closed Treated Water Systems program will provide reasonable assurance that the aging effects associated with closed treated water environments will be adequately managed so that the intended functions of components within the scope of license renewal are maintained during the period of extended operation.

B.2.1.14 Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

Program Description

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems aging management program is an existing condition monitoring program that manages the aging effects of loss of material on the bridge, bridge rails, bolting, and trolley structural components for cranes, hoists, and rigging beams in air-indoor uncontrolled and treated water environments. The program also manages loss of preload of associated bolted connections. Procedures and controls implement the guidance on the control of overhead heavy load cranes specified in NUREG-0612, “Control of Heavy Loads at Nuclear Power Plants.” The program utilizes periodic inspections as described in the ASME B30 series of standards for inspection, monitoring and detection of aging effects.

The scope of cranes, hoists, rigging beams, and refueling equipment within the scope of license renewal is based on those that must comply with NUREG-0612, “Control of Heavy Loads at Nuclear Power Plants.” Overhead lifting equipment that operates over safety-related equipment is included within the scope of license renewal. The reactor building crane, approximately 60 cranes and hoists, and numerous rigging beams are managed by the program. Also in scope for license renewal are equipment handing systems that handle ‘light’ loads including equipment, tools and fuel, over fuel and safety-related equipment within the spent fuel pool and reactor cavity.

Inspection frequency and scope is consistent with the recommendations for periodic inspection within the ASME B30 series of standards. Periodic inspections are performed annually. For handling systems that are infrequently in service, such as those only used during refueling outages, periodic inspections may be deferred until just prior to use.

The program includes performance of a periodic inspection as defined in the appropriate ASME B30 series standard for all cranes, hoists, and equipment handling systems within the scope of license renewal. The program will be enhanced to provide additional guidance to include inspection of structural components and bolting for loss of material due to corrosion; rails for loss of material due to wear and corrosion; and bolted connections for loss of preload.

NUREG-1801 Consistency

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems aging management program will be consistent with the ten elements of aging management program XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems,” specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancement will be implemented in the following program elements:

1. Provide additional guidance to include inspection of structural components, rails, and bolting for loss of material due to corrosion; rails for loss of material due to wear; and bolted connections for loss of preload. **Program Elements Affected: Scope of Program (Element 1), Parameters Monitored/Inspected (Element 3), and Detection of Aging Effects (Element 4)**

Operating Experience

The following examples of operating experience provide objective evidence that the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In June 2011, a periodic inspection of the reactor building crane identified signs of wear on east and west side rails and the associated bridge wheels. A corrective action program issue report was initiated. Corrective actions included working with the crane vendor to determine that the cause of the rail wear and wheel damage was misalignment of the rails. Repairs were made to realign the rails and replace or repair the wheels.

This example provides objective evidence that the inspection, corrective action, and maintenance programs are effective in identifying minor degraded conditions caused by aging effects and implementing corrective actions to identify the cause and correct the condition prior to the condition potentially impacting the intended function.

2. During maintenance on the reactor building crane in April 2012, a mechanic identified minor cracks in the end ties near the connection to the main bridge girder. A corrective action program issue report was initiated and the crane was removed from service until repaired. The condition was evaluated and a repair plan was developed and approved by engineering to grind out the cracks and perform weld repair. The repair was completed prior to placing the crane into service.

This example provides objective evidence that when material deficiencies are identified, the corrective action program is used to identify and evaluate the condition, and implement repair activities that meet ASME B30 standards to correct the condition prior to loss of function.

3. During inspection of the Unit 2 turbine building crane in 2012, one bolt was found sheared and several structural bolts were found to be loose. Corrective action program issue reports were created and the crane was removed from service until repaired. The cause was determined to be increased friction at one of the cab wheels which caused vibration in the trolley rails, causing loosening of the bolts. The condition was corrected by replacing the sheared bolt, tightening the loose bolts, and inspection and repair of the cab wheels. Corrective actions to prevent recurrence also included revision to the preventive maintenance tasks for the Unit 1 and 2 turbine building cranes and the reactor building crane to include a representative from the company that manufactured the crane when performing annual periodic inspections, and to use a man-lift when inspecting those cranes to provide for more thorough inspection.

This example provides objective evidence that inspections of crane and hoist structural components being performed to meet ASME B30 standards are effective in identifying degradation to material condition prior to loss of function. This example also demonstrates that corrective action program is used to identify and evaluate the cause of the condition, implement repair activities that meet ASME B30 standards to correct the condition, and identify and implement corrective actions to prevent recurrence.

The operating experience relative to the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of material and loss of preload. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the enhanced Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program will provide reasonable assurance that the loss of material and loss of preload aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.15 Compressed Air Monitoring

Program Description

The Compressed Air Monitoring aging management program is an existing condition monitoring program that manages loss of material on piping and components in a condensation environment in the compressed air systems. The Compressed Air Monitoring program includes monitoring of air moisture content and contaminants such that specified limits are maintained, and inspection of components for indications of loss of material due to corrosion.

This program is based on the LSCS response to NRC GL 88-14, “Instrument Air Supply Problems;” and utilizes guidance and standards provided by ANSI/ISA-S7.3, “Quality Standard for Instrument Air,” INPO’s Significant Operating Experience Report (SOER) 88-01, “Instrument Air System Failures;” and ASME OM-S/G-1998, Part 17, “Performance Testing of Instrument Air Systems in Light-Water Reactor Power Plants.” The Compressed Air Monitoring program activities implement the moisture content and contaminant criteria of ANSI/ISA-S7.3 (incorporated into ISA-S7.0.1-1996).

Program activities include air quality checks at various locations to ensure that dew point, particulates, and hydrocarbons are maintained within the specified limits and periodic inspections of select compressed air system component internal surfaces for signs of loss of material due to corrosion. The effects of corrosion and presence of contaminants are detected during quarterly surveillances, and preventive maintenance inspections of compressors, filters, dryers, and specific compressed air system components. The procedures and maintenance activities for these inspections include specific inspection acceptance criteria. The periodic inspections of accessible internal surfaces of components provide assurance that the systems within the scope of license renewal will perform their intended function.

Results from the periodic inspections are compared with established acceptance criteria to provide for timely detection of aging effects. The monitoring methods are effective in detecting the applicable aging effects and the frequency of monitoring is adequate to prevent significant age-related degradation. Deficiencies are documented in the corrective action program and evaluations are performed for test or inspection results that do not satisfy established criteria. The corrective action program ensures that the conditions adverse to quality are promptly corrected. The site corrective action program is implemented in accordance with the requirements of the 10 CFR Part 50, Appendix B quality assurance program.

NUREG-1801 Consistency

The Compressed Air Monitoring aging management program will be consistent with the ten elements of aging management program XI.M24, "Compressed Air Monitoring,” specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

1. NUREG-1801 states that daily readings of system dew point are recorded and trended. Daily system dew point readings are not recorded or trended. **Program Element Affected: Monitoring and Trending (Element 5)**

Justification for Exception

As per ANSI/ISA-7.0.01-1996 Section 5.1, "a monitored alarm is preferred; however if a monitored alarm is unavailable, per shift monitoring is recommended.” The instrument compressed air system dryer outlet dew points are continuously monitored utilizing in line detectors with automatic alarms in the main control room should limits be exceeded. On a quarterly basis, samples are taken from representative locations and are analyzed for dew point as well as particulates and hydrocarbons, which validates the dew point in line detectors.

NUREG-1801 provides guidance that the Compressed Air Monitoring aging management program is based on the results of the plant owner’s response to Nuclear Regulatory Commission (NRC) Generic Letter (GL) 88-14 (as applicable to license renewal). ANSI/ISA-7.0.01-1996, Section 5.1 and Annex C 3.1, identifies continuous monitoring as the preferred method for monitoring dew point. In addition, per NUREG-1801 Chapter XI.M24, Element 4 “Detection of Aging Effects,” two different methods of monitoring dew point are identified that are acceptable, one of which includes utilizing continuous monitoring equipment with automatic alarm capability or daily checks of dew point values. The monitoring equipment is validated quarterly when samples are taken from various locations of the compressed air system and are analyzed for moisture content as well as particulate and hydrocarbons. The plant operating experience has shown that the original design, along with quarterly sampling and continuous automatic alarms, to be an effective method to monitor the compressed air system dryer outlet dew points to provide reasonable assurance that the components in the compressed air system will continue to perform the specified intended functions.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Inspect the internal surfaces of system filters, compressors, and after-coolers for signs of corrosion and corrosion products. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)**

2. Perform analysis and trending of air quality monitoring results and visual inspection results. **Program Element Affected: Monitoring and Trending (Element 5)**

3. Document deficiencies which are identified during visual inspections of the internal surfaces of system components in the corrective action program. **Program Element Affected: Acceptance Criteria (Element 6)**

Operating Experience

The following examples of operating experience provide objective evidence that the Compressed Air Monitoring program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. Air quality checks are performed on a quarterly basis. As an example, a Unit 1 instrument air system sample was taken on August 15, 2013 to be analyzed for dew point, hydrocarbons, and particulates. The sample analysis results were within the acceptance criteria for each parameter. This air quality surveillance is performed quarterly at several locations in the instrument air and drywell pneumatic air plant systems in accordance with the LSCS Generic Letter 88-14 commitments. This example provides objective evidence that the Compressed Air Monitoring aging management program effectively monitors the appropriate parameters to identify aging effects of the system. The existing program contains acceptance criteria that will ensure that the compressed air system will be able to perform its intended function for the period of extended operation.

2. Ultrasonic examination of the common unit station air dryer vessels was performed in 2011, as part of routine preventive maintenance performed on a three-year frequency. The examination results revealed that some areas of the vessel walls were degraded. The as-found measurements were confirmed to be greater than the calculated minimum wall values which were documented in an engineering design package, and therefore acceptable for continued service. This condition was entered into the corrective action program for further analysis and monitoring so that future actions could be planned and scheduled when appropriate. These vessels continue to be monitored on a 3-year frequency. Should the corrosion rate increase, corrective actions will be developed and implemented prior to loss of intended function. This example provides objective evidence that the corrective action program is effectively used to document degraded conditions, and to evaluate conditions for action prior to loss of intended function.

3. In February, 2008, a common unit Station Air Dryer High Humidity alarm was received. A corrective action program issue report was initiated. An equipment operator was dispatched to investigate and troubleshoot the condition. Investigation determined that the desiccant was indicating sufficiently dry air, and that the replacement of a circuit board in the humidity sensing circuit was required. After circuit board replacement, the humidity sensor was calibrated and the dryer was returned to service. This example illustrates that continuous monitoring of compressed air dew point with a main control room alarm is effective in ensuring air quality is maintained, and that that the corrective action program is effectively is used to troubleshoot and repair degraded conditions.

The operating experience relative to the Compressed Air Monitoring program confirmed that system performance and condition is being monitored effectively. The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of material.

Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Compressed Air Monitoring program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Compressed Air Monitoring program will provide reasonable assurance that the loss of material aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.16 Fire Protection

Program Description

The Fire Protection aging management program is an existing condition and performance monitoring program that manages the identified aging effects for the fire barriers and the low pressure carbon dioxide systems and associated components in air–indoor uncontrolled and air–outdoor environments through the use of periodic inspections and functional testing to detect aging effects prior to loss of intended functions. System functional tests and inspections are performed in accordance with guidance from National Fire Protection Association Codes and Standards. The program applies to piping, piping components, and piping elements, curbs, and fire barriers (doors and dampers, penetration seals, walls, and slabs).

The Fire Protection program monitoring methods are effective in detecting the applicable aging effects and the frequency of monitoring is adequate to prevent significant degradation. The Fire Protection program manages visual inspections of fire barrier penetration seals for signs of degradation such as loss of material, cracking, seal separation from walls and components, separation of layers of material, hardening, and loss of strength through periodic inspection. The program requires performance of visual inspections of not less than 10 percent of each type of penetration seal at least once per refueling cycle (24 months). The program specifies visual examinations of the fire barrier walls, ceilings, and floors in structures within the scope of license renewal at a frequency of at least once per 24 months. Periodic visual inspections and functional tests are used to manage the aging effects of fire doors. The visual inspection frequency for fire doors is at least once per 24 months, and functional tests of closing mechanisms and latches for required doors is at least once per six months. Fire dampers shall be verified to be functional by visual inspection at least once per 24 months.

The program will also provide for aging management of external surfaces of the low pressure carbon dioxide fire suppression system components that are within the scope of license renewal through periodic functional tests and visual inspections for corrosion that may lead to loss of material.

These inspections and tests are implemented through station procedures and recurring task work orders. Personnel performing inspections are qualified and trained to perform the inspection activities. Unacceptable conditions are entered into the corrective action program for proper disposition.

The program will be enhanced, as noted below, to provide reasonable assurance that the Fire Protection program aging effects will be adequately managed during the period of extended operation.

NUREG-1801 Consistency

The Fire Protection aging management program will be consistent with the ten elements of aging management program XI.M26, "Fire Protection," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Perform periodic visual inspection of combustible liquid spill retaining curbs. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)**.

2. Perform periodic visual inspection for identification of corrosion that may lead to loss of material on the external surfaces of the low pressure carbon dioxide fire suppression systems. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)**.

3. Provide additional inspection guidance to identify aging effect as follows:

   a. Fire barrier walls, ceilings, and floors degradation such as spalling, cracking, and loss of material for concrete.

   b. Elastomeric fire barrier material degradation such as loss of material, shrinkage, separation from walls and components, increased hardness, and loss of strength.

Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6).

4. Provide additional inspection guidance to identify degradation of fire barrier penetration seals for aging effects such as loss of material, cracking, increased hardness, shrinkage, and loss of strength. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)**.

Operating Experience

The following examples of operating experience provide objective evidence that the Fire Protection program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In January 2009, damage was identified on an electrical fire seal in the auxiliary building while performing periodic visual inspection of fire penetration seals. An approximately one inch diameter hole, five inches deep, was identified through the outer gypsum layer. No hole was found on the other side of the wall penetration and the damager did not penetrate the entire fire seal. This condition was entered into the corrective action program, evaluated by Engineering and scheduled for future repair since the seal continued to meet design requirements in the damaged condition. This example demonstrates

that the Fire Protection program is effective in identifying deficient conditions prior to the loss of intended function of fire barriers.

2. In January 2009, damage to a fire seal was identified on the turbine building side of electrical wall penetration seal separating the auxiliary building and the Unit 2 turbine building. The damaged (loose) section of the CT gypsum seal measured approximately seven inches wide, two inches high, and over one inch deep. The condition was entered into the corrective action program and evaluated and determined that adequate fire barrier materials existed to assure the fire barrier function. A work request was initiated and implemented to prevent further degradation. This example demonstrates that the Fire Protection program is effective in identifying degraded conditions and correcting them prior to loss of intended function.

3. In September 2005, damage to a fire door seam was identified that rendered the door inoperable. The seam is designed to provide an overlap when the doors are closed. The seam was bent such that a gap existed between the stationary and moving door. Upon discovery of this condition, the door was declared inoperable and a once per hour fire watch was established as a compensatory action until repairs were completed. This example provides objective evidence that the visual inspections performed in accordance with the Fire Protection program are adequate to identify deficient conditions and that adequate compensatory measures are taken when deficient conditions are identified.

The operating experience relative to the Fire Protection program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including change in material properties, concrete cracking and spalling, cracking, and loss of material. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Fire Protection program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Fire Protection program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Fire Protection program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.17 Fire Water System

Program Description

The Fire Water System aging management program is an existing condition monitoring, performance monitoring, and preventive program that manages the loss of material in air–indoor uncontrolled, air–outdoor, condensation, and raw water environments for water-based fire protection systems that consist of sprinklers, nozzles, fittings, valve bodies, fire pump casings, hydrants, hose stations, standpipes, and aboveground and buried piping and components. These components are tested in accordance with the applicable National Fire Protection Association (NFPA) codes and standards with deviations as described in the NRC approved fire protection program. Flow testing and visual inspections are performed to ensure that loss of material due to general, pitting and crevice corrosion, microbiologically influenced corrosion (MIC), or fouling, and flow blockage due to fouling is adequately managed. A review of LSCS operating experience has revealed instances of recurring internal corrosion in the fire water system piping that is within the scope of the Fire Water System program. Inspections will be performed on the carbon steel fire water piping for corrosion and degradation of the piping internal surfaces.

In addition to commitments and deviations to NFPA codes and standards as described in the NRC approved fire protection program, the program will be enhanced for portions of the water-based fire protection system that are (a) normally dry but periodically subject to water flow; and (b) that cannot be drained or allow water to collect, to perform additional testing or inspections.

The water-based fire protection system is normally maintained at required operating pressure and monitored such that loss of system pressure is immediately detected and corrective actions initiated. The fire water header pressure is indicated in the main control room. A low pressure condition is alarmed in the control room by the auto start of the electric motor driven intermediate fire pump, followed by the start of the ‘A’ diesel-driven fire pump and ‘B’ diesel-driven fire pump at staggered pressures if the low pressure condition continues to exist.

The Fire Water System aging management program includes replacement or testing of a representative sample of sprinklers before they reach 50 years of service. This replacement or testing requirement is consistent with LSCS commitments to NFPA 13A, 1981 Edition, included with the NRC approved fire protection program and the guidance of NFPA 25, 2011 Edition.

External surfaces of buried fire main piping are evaluated as described in the Buried and Underground Piping (B.2.1.28) aging management program.

NUREG-1801 Consistency

The Fire Water System aging management program will be consistent with the ten elements of aging management program XI.M27, "Fire Water System,” specified in NUREG-1801, as modified by LR-ISG-2012-02, with the following exceptions:

Exceptions to NUREG-1801

1. NUREG-1801, Chapter XI.M27, as modified by LR-ISG-2012-02, states in Table 4a that fire main drain tests shall be conducted consistent with NFPA 25, 2011 Edition, Section 13.2.5. This NFPA 25 section states that a main drain test shall be conducted annually at each water-based fire protection system riser to determine whether there has been a change in the condition of the water supply piping and control valves. Annual main drain tests are not performed. **Program Element Affected: Detection of Aging Effects (Element 4)**

Justification for Exception:

The main drain testing described in NFPA 25 is intended to verify that no obstructions to flow exist in the piping between the fire pumps and fire water risers. Flow testing for 36 in scope wet-pipe sprinkler systems is performed on a quarterly frequency. The scope of these tests includes the piping between the fire pumps and the risers and accomplishes the same purpose as the annual main drain tests to verify that obstructions to flow do not exist. In addition to these quarterly tests, five dry pipe sprinkler systems are flow tested every 18 months, two deluge systems are flow tested every 18 months, and four deluge systems are flow tested every refuel cycle. These flow tests include as part of their flow path the same piping that would be included in the scope of the main drain tests. Therefore, main drain testing would not provide any additional meaningful information to assess the condition of the fire water piping for obstructions. In addition to flow testing the sprinkler and deluge systems, annual testing of the yard hydrants and flow testing of the fire main every three years provides assurance that the fire main/loop header is free from obstructions to flow, which is a the significant portion of the piping that would be tested by a main drain test. The flow tests described above are supplemented by verifying that fire water flowpath valves are in their correct position every quarter and cycling the valves annually. The Fire Water System program is also being enhanced to perform flow testing of the fire hose stations located at the hydraulically most limiting locations in each zone every five years which will also identify obstructions to flow in the same fire piping subject to main drain testing. The combination of testing and inspections described above, some of which is performed more frequently than the annual main drain testing, provides reasonable assurance that obstructions to flow will be identified and corrected prior to loss of intended function.

2. NUREG-1801, Chapter XI.M27, as modified by LR-ISG-2012-02, states that deluge valves shall be trip tested annually at full flow or tested with air to ensure the nozzles are not obstructed. LR-ISG-2012-02 states that where plant conditions prevent the performance of tests and inspections, the tests and inspections may be performed during plant shutdowns on a refuel cycle interval. The LaSalle deluge systems for charcoal filter units cannot be tested with water and have no provisions to perform an air test to verify that the spray openings are not obstructed. **Program Element Affected: Detection of Aging Effects (Element 4)**

Justification for Exception:

NUREG-1801, as modified by LR-ISG-2012-02, states that deluge valve tests shall be conducted consistent with NFPA 25, 2011 Edition. NFPA 25 states that deluge valves shall be trip tested annually at full flow and that where water cannot be discharged due to the nature of the protected property, the system shall be tested with air to ensure the nozzles are not obstructed. In addition, deluge system discharge patterns from open nozzles shall be observed to ensure patterns are not impeded by plugged nozzles, to ensure the nozzles are correctly positioned, and to ensure that obstructions do not prevent discharge patterns from wetting the surfaces to be protected. Where water cannot be discharged due to the nature of the protected property, the nozzles shall be inspected for proper orientation and the system tested with air to ensure the nozzles are not obstructed. Note 5 of LR-ISG-2012-02 Table 4a states that where plant conditions prevent the performance of tests and inspections, the tests and inspections may be performed during plant shutdowns on a refuel cycle interval.

The LaSalle fire water deluge systems for the ventilation charcoal filters have all of their spray spargers located within their associated charcoal filter plenums and are not directly accessible for inspection. A water flow test cannot be performed for these deluge systems because the filter media efficiency will be compromised if the charcoal is wetted and the design does not include provisions for alternate air flow testing as described in NFPA 25. The charcoal filter deluge systems are maintained dry at all times and are not subjected to intermittent wet and dry conditions that promote corrosion of internal surfaces and the charcoal filter deluge systems are manually initiated to admit water to the spray spargers. The deluge piping from the deluge valves to the spray openings inside the filter plenums is constructed of stainless steel and not subject to corrosion or generation of corrosion products that could obstruct the spray openings in the spargers for those filter deluge systems that have a fire protection function in accordance with 10 CFR 50.48. The spray openings are located inside the filter plenums where they are protected from inadvertent bumping and mechanical damage that could impact their spray capability.

In lieu of testing, the Fire Water System program will be enhanced to perform external visual inspection of the deluge header inside the filter plenum and accessible portions of the spray spargers to assure they are not obstructed every refuel cycle interval. The Fire Water System program will also be enhanced to perform internal visual inspections of one of the 11 charcoal filter deluge systems every five years. If degraded conditions are identified, the inspections will be expanded to all 11 charcoal filter deluge systems every five years. These inspections provide reasonable assurance that the charcoal filter deluge systems will continue to perform their intended function.

3. NUREG-1801, Chapter XI.M27, as modified by LR-ISG-2012-02, states that internal visual inspections used to detect loss of material are capable of detecting surface irregularities that could be indicative of wall loss below nominal wall thickness due to corrosion and corrosion product deposition. Where such irregularities are detected, followup volumetric examinations are performed. Although visual inspections may be capable of detecting surface irregularities, if such irregularities are detected, followup volumetric examinations will not be performed when the observed wall thickness is

indicative of wall loss below nominal pipe wall thickness. **Program Element Affected: Detection of Aging Effects (Element 4)**

Justification for Exception:

The nominal pipe wall thickness is tabulated for various pipe sizes and schedules in ASME B36.10M, Welded and Seamless Wrought Steel Pipe. The wall thickness values listed in this ASME standard are the design wall thicknesses for new piping from the pipe manufacturer. However, variations in the wall thickness are permissible due to mill tolerances in the manufacturing process (generally 12.5 percent). As such, acceptable new piping from the manufacturer could have a wall thickness as much as 12.5 percent below the nominal wall thickness prior to the occurrence of any age-related degradation. Since the nominal wall thickness is the design wall thickness of new piping, any indications of loss of material, no matter how trivial, would be an indication of wall loss below nominal. The piping managed by the Fire Water System (B.2.1.17) aging management program will have been exposed to a raw water environment for approximately 40 years before the program is implemented. Uniform corrosion of steel piping in a raw water environment is expected to occur and, as such, the wall thickness of all Fire Protection System piping can be expected to be below the nominal wall thickness. However, due to the low pressure of the system, the pressure boundary function of Fire Protection System piping is maintained at wall thicknesses well below nominal. The results of visual inspections that indicate the condition of the Fire Protection System piping is as-expected (i.e., the surface is subject to uniform general corrosion with no noticeable deposits of corrosion products in excess of a normal oxide layer) will be acceptable. Internal visual inspections are incapable of providing a quantitative assessment of the amount of wall loss of system components and instead provide only a qualitative assessment of the internal condition of the system. Since internal visual inspections are inherently qualitative, the use of quantitative acceptance criteria (e.g., wall loss beyond 12.5 percent of nominal wall thickness is unacceptable) is not practical. As such, visual inspection results will be entered into the corrective action program if unexpected levels of degradation are identified. Unexpected levels of degradation include excessive accumulation of corrosion products and appreciable localized corrosion (e.g., pitting) beyond a normal oxide layer. Therefore, all surface irregularities that could be indicative of wall loss below nominal pipe wall thickness identified during internal visual inspections of the Fire Protection System will not require followup volumetric examination. Instead, followup volumetric examinations will be performed if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval.

The Fire Water System program provides for periodic volumetric examinations to monitor for loss of material in system piping as well as internal visual inspections to monitor for flow blockage. The Fire Water System program will be enhanced to include volumetric examinations at five locations every year for aboveground piping (Enhancement 1) and internal visual inspections of in scope wet pipe sprinkler, dry pipe, and deluge systems every five years (Enhancement 3). Followup volumetric examinations will be performed when visual inspections identify age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval. This approach is consistent with the intent of the NRC's guidance on aging management of Fire Protection System piping in that both volumetric examinations (for loss of material) and internal visual inspection (for flow blockage) are performed.

In addition, sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have additional tests and inspections, including volumetric examinations as described in Enhancement 3, on piping segments that cannot be drained or that allow water to collect.

The use of visual internal inspections for loss of material and flow blockage in conjunction with volumetric examinations when appropriate to evaluate unexpected levels of degradation provides reasonable assurance that the Fire Water System (B.2.1.17) program will ensure that aging is adequately managed such that intended functions are maintained consistent with the current licensing basis through the period of extended operation.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Perform volumetric examinations at five locations on the carbon steel aboveground fire water piping susceptible to microbiologically induced corrosion (MIC) every year to identify loss of material. Additional locations will be examined if these volumetric examinations or plant operating experience identify significant degradation. For through-wall leaks and material loss greater than 50 percent of nominal wall, four additional locations will be examined. Where the identified material loss is 30 percent to 50 percent of nominal wall thickness and the calculated remaining life is less than two years, two additional locations will be examined. **Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)**

2. Perform visual inspections, for loss of material and flow obstructions, of the accessible header piping and sparger external surfaces for the deluge systems located within filter plenums on a once per refueling cycle frequency. The visual inspection will include verification that the piping and spargers are in their proper position and that there are no obstructions to the desired spray patterns. **Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)**

3. Perform internal visual inspections of sprinkler and deluge system piping to identify internal corrosion and obstructions to flow. Followup volumetric examinations will be performed if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval.

The internal visual inspections will consist of the following:

a. Wet pipe sprinkler systems - 50 percent of the wet pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

b. Dry pipe sprinkler systems - Dry pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

c. Deluge systems- Deluge systems in scope for license renewal, except for the charcoal filter deluge systems, will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

    i. The in scope charcoal filter deluge systems will have visual internal inspections performed on one of the 11 systems every five years. If degraded conditions are identified, the inspections will be expanded to include all 11 charcoal filter deluge systems every five years.

d. Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have additional tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect.

    i. These additional inspections, if required, will be performed in each five-year interval beginning five years prior to the period of extended operation.

    ii. This additional inspection consists of either a flow test or flush sufficient to detect potential flow blockage or a visual inspection of 100 percent of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect.

    iii. In addition, in each five-year interval of the period of extended operation, 20 percent of the length of piping segments that cannot be drained or piping segments that allow water to collect is subject to volumetric wall thickness inspections.

Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)

4. Perform obstruction evaluations when degraded conditions are identified by visual inspections, flow testing, or volumetric examinations. The obstruction evaluations will include an extent of condition determination, need for increased inspections, and followup examinations if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval. **Program Element Effected: Acceptance Criteria (Element 6)**

5. Perform flow tests for hose stations at the hydraulically most limiting locations for each zone of the system on a five-year frequency to demonstrate the capability to provide the design pressure at required flow. **Program Elements Effected: Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

Operating Experience

The following examples of operating experience provide objective evidence that the Fire Water System program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In October 2010, during testing of the dry pipe preaction sprinkler system for the cable trays over labs, plugging of the valve used for the flow test was identified. This finding was entered into the corrective action program for evaluation. The valve was found plugged with a mud-like substance and was subsequently cleared and flow established through the sprinkler header. Because the nozzles on this sprinkler system have a smaller flow area than the valve, actions were immediately taken to determine if the system nozzles were also plugged. All 35 branch lines of the sprinkler system were flushed and two branch lines were found to have blockage. One branch line was blocked with a mud-like substance, and another branch line was blocked with a rag. Based on these test results, the preaction systems for the cable spreading rooms and diesel generator corridors were tested and no blockage was identified in these systems. Subsequent investigation concluded that the mud-like substance was typical of silt from the cooling lake and corrosion products from the galvanized steel piping. This had accumulated over time in the sprinkler piping due the nature of the test configuration. In the past, the preaction sprinkler systems are normally maintained dry and pressurized with air. The sprinkler systems are periodically tested with water to verify flow through the header. The water tests were performed by removing one nozzle and connecting a valve and hose to route the test water to a floor drain. In this manner, only one branch of the system was flushed. As a result of the repeated testing, silt accumulated in the remaining system branches and eventually led to the flow blockage. To prevent similar silt accumulation, the testing configurations for the preaction sprinkler systems have been modified to include all branch lines and all nozzles. This is accomplished by testing/flushing a different 25 percent to 33 percent of the nozzles at each test resulting in all nozzles and branches being tested/flushed every six years. Test results with this new configuration have not identified any blockage. This event demonstrates the effective use of the corrective action program to evaluate unexpected conditions, identify the cause of the problem, perform extent of condition reviews, and implement effective

corrective actions.

2. In January 2012, a through-wall leak was identified in fire header piping that connects to a hose reel station. A corrective action program issue report was initiated to evaluate the condition. The leak was located on the drip leg portion of the piping. The piping was isolated, the leaking portion removed and new pipe and cap installed. This condition was also evaluated as part of the raw water corrosion program and an extent of condition review resulted in the ultrasonic examination of four additional locations. These inspections identified material loss and all had remaining wall thickness in excess of design requirements for their respective locations. This event demonstrates the effective use of the corrective action program and, where warranted, the use of additional examination locations to identify extent of condition.

3. In March 2010, a through-wall leak was identified on a fire protection system pipe elbow beneath the retarding chamber for the 1A diesel generator fuel oil tank. The condition was entered into the corrective action program. This portion of the piping is only exposed to water during testing or system actuations. The leaking elbow was replaced and upstream valve rebuild to correct the problem. This event demonstrates that system degradation, when identified, is evaluated and actions are taken to correct the problem.

4. A review of LSCS operating experience has revealed instances of recurring internal corrosion in the fire water system piping that is within the scope of the Fire Water System program. Inspections will be performed on the carbon steel fire water piping for corrosion and degradation of the piping internal surfaces. These additional inspections meet the guidance provided in LR-ISG-2012-02. This example provides objective evidence that Interim Staff Guidance is reviewed and incorporated into aging management programs.

The operating experience relative to the Fire Water System program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of material. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Fire Water System program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Fire Water System program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Fire Water System program will provide reasonable assurance that the loss of material aging effect will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.18 Aboveground Metallic Tanks

Program Description

The Aboveground Metallic Tanks aging management program is an existing condition monitoring program which includes outdoor tanks sited on soil or concrete and indoor large volume tanks containing water with internal pressures approximating atmospheric pressure that are sited on concrete. The program will be enhanced to provide for management of loss of material and loss of sealing for metallic tanks within the scope of the program exposed to air–outdoor, concrete, condensation, soil, and treated water environments. The Unit 1 and Unit 2 cycled condensate storage tanks are the only tanks within the scope of this program. These tanks are fabricated from aluminum plates and are not coated or insulated. The aluminum alloy is not susceptible to cracking. The program includes caulking at the tank interface with the tank foundation as a preventive measure to mitigate corrosion. Visual inspections are performed to monitor degradation of the tank surfaces and caulking. Visual inspections of interior tank surfaces are performed to detect loss of material. The bottoms of the tanks are examined volumetrically. These inspections and examinations ensure that significant degradation is not occurring and that the intended function of the cycled condensate storage tanks is maintained during the period of extended operation.

NUREG-1801 Consistency

The Aboveground Metallic Tanks aging management program will be consistent with the ten elements of aging management program XI.M29, "Aboveground Metallic Tanks," specified in NUREG-1801, as modified by LR-ISG-2012-02.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Perform a visual inspection of the tank shell, roof, and bottom interior surfaces for signs of loss of material on one of the cycled condensate storage tanks within five years prior to the period of extended operation. This inspection shall include both wetted and non-wetted surfaces and may be either direct visual inspection from inside the tanks or volumetric examination from outside the tank. A volumetric examination from outside the tank will include 25 percent of the tank surface area. Should the one-time inspection identify degradation, periodic inspections with an inspection frequency based on the rate of degradation will be established for both tanks. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

2. Perform a visual inspection of the exterior surfaces of both cycled condensate storage tanks for loss of material each refueling interval. **Program Elements Affected: Parameters Monitored and Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

3. Perform a volumetric examination of the tank bottom for both cycled condensate storage tanks for signs of loss of material whenever the tanks are drained. At a minimum, an inspection shall be performed within 10 years prior to the period of extended operation and subsequent inspections shall be performed in each 10-year period during the period of extended operation. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

4. Perform an inspection of the caulking at the perimeter of the cycled condensate storage tank bases for signs of degradation each refueling interval. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

Operating Experience

The following examples of operating experience provide objective evidence that the Aboveground Metallic Tanks program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In June 2010, samples of rain water captured in the Unit 1 cycled condensate storage tank berm were identified to contain tritium. This condition was entered into the corrective action program for evaluation. Subsequent investigations to identify the source of the tritium determined the source to be the cycled condensate storage tank. No leaks were obvious from visible external tank surfaces and the tank was drained for further inspection. The inspection revealed three locations where corrosion from the underside of the tank caused through-wall leaks. Samples of the tank bottom as well as samples of the sand at the leak locations were removed for chemical and metallurgical analysis. The cause of the corrosion was determined to be attributable to chlorides in the sand. The entire bottom of the tank was volumetrically examined and thinned areas were repaired by welding patch plates over the degraded locations. The Unit 2 cycled condensate storage tank was also drained and examined. Several locations were identified to be degraded and were repaired in the same manner as the Unit 1 tank. Work orders were established to reinspect the bottoms of both tanks in eight years as well as strengthen the inspection requirement for the caulk that is used to seal the tank perimeter to its foundation to prevent water intrusion to the underside of the tank. This event demonstrates the effective use of the corrective action program to identify degraded conditions, perform extent of condition reviews, and take timely corrective action to preserve the ability of the tanks to perform their intended function.

2. In October 2012, while performing operator rounds, the caulking at the base of the Unit 2 cycled condensate storage tank was identified to be degraded with the potential for allowing water to enter the area under the tank bottom. The observation was entered into the corrective action program for evaluation maintenance personnel were directed to clean the area and repair the caulk. This event demonstrates that personnel performing routine rounds are sensitive to degrading conditions and that corrective actions are taken in a timely manner when degraded conditions are identified.

3. In August 2008, corrosion was identified during an annual inspection on the hydrogen storage tank, which is not in scope for license renewal. The degradation was entered into the corrective action program for evaluation. The condition was evaluated and the tank cleaned and repainted to restore the protective coating on the tank outer surface to prevent corrosion. This event demonstrates that periodic inspections and timely corrective action are effective in preventing degradation of coated surfaces to maintain pressure boundary integrity and prevent the loss of component functionality.

The operating experience relative to the Aboveground Metallic Tanks program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of material and loss of sealing. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Aboveground Metallic Tanks program will be performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the enhanced Aboveground Metallic Tanks program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Aboveground Metallic Tanks program will provide reasonable assurance that the loss of material and loss of sealing aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.19 Fuel Oil Chemistry

Program Description

The Fuel Oil Chemistry aging management program is an existing mitigative and condition monitoring program that includes activities which provide assurance that contaminants are maintained at acceptable levels in fuel oil for systems and components within the scope of license renewal. The Fuel Oil Chemistry program manages loss of material in piping, piping elements, piping components and tanks in a fuel oil environment. The fuel oil tanks within the scope of license renewal are maintained by monitoring and controlling fuel oil contaminants in accordance with the Technical Specifications, Technical Requirements Manual, and ASTM guidelines. Fuel oil sampling and analysis is performed in accordance with approved procedures for new fuel oil and stored fuel oil. Fuel oil tanks are periodically drained of accumulated water and sediment, cleaned, and internally inspected. These activities effectively manage the effects of aging by maintaining potentially harmful contaminants at low concentrations.

NUREG-1801 Consistency

The Fuel Oil Chemistry aging management program will be consistent with the ten elements of aging management program XI.M30, "Fuel Oil Chemistry," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Perform periodic (quarterly) sampling and analysis for water and sediment content, particulate concentration, and the levels of microbiological organisms for diesel fuel storage tanks 0DO01T, 1DO01T, and 2DO01T. **Program Elements Affected: Parameters Monitored/ Inspected (Element 3), Detection of Aging Effects (Element 4)**

2. Perform periodic (quarterly) sampling and analysis for water and sediment content, particulate concentration, and the levels of microbiological organisms for HPCS diesel fuel storage tanks 1DO02T and 2DO02T. **Program Elements Affected: Parameters Monitored/ Inspected (Element 3), Detection of Aging Effects (Element 4)**

3. Perform periodic (quarterly) sampling and analysis for water and sediment content and the levels of microbiological organisms for diesel generator day tanks 0DO02T, 1DO05T, and 2DO05T. **Program Elements Affected: Parameters Monitored/ Inspected (Element 3), Detection of Aging Effects (Element 4)**

4. Perform periodic (quarterly) sampling and analysis for water and sediment content and the levels of microbiological organisms for HPCS diesel day tanks 1DO04T and 2DO04T. **Program Elements Affected: Parameters Monitored/ Inspected (Element 3), Detection of Aging Effects (Element 4)**

5. Perform periodic (quarterly) sampling and analysis for water and sediment content, particulate concentration, and the levels of microbiological organisms for diesel fire pump day tanks 0FP01TA and 0FP01TB. **Program Elements Affected: Parameters Monitored/ Inspected (Element 3), Detection of Aging Effects (Element 4)**

6. Perform periodic internal inspections of diesel fire pump day tanks 0FP01TA and 0FP01TB at least once during the 10-year period prior to the period of extended operation, and at least once every 10 years during the period of extended operation. Each diesel fuel tank will be drained and cleaned, the internal surfaces visually inspected (if physically possible), and, if evidence of degradation is observed during inspections, or if visual inspection is not possible, these diesel fuel tanks will be volumetrically inspected. **Program Elements Affected: Preventive Actions (Element 2), Detection of Aging Effects (Element 4)**

7. Perform volumetric inspection of diesel fuel storage tanks 0DO01T, 1DO01T, and 2DO01T; HPCS diesel fuel storage tanks 1DO02T and 2DO02T; diesel generator day tanks 0DO02T, 1DO05T, and 2DO05T; and HPCS diesel day tanks 1DO04T and 2DO04T if evidence of degradation is observed during visual inspection, or if visual inspection is not possible. **Program Element Affected: Detection of Aging Effects (Element 4)**

8. Perform periodic (quarterly) trending of water and sediment content, particulate concentration, and the levels of microbiological organisms for all fuel oil tanks within the scope of the program. **Program Element Affected: Monitoring and Trending (Element 5)**

Operating Experience

The following examples of operating experience provide objective evidence that the Fuel Oil Chemistry program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In July 2013, it was identified that the monthly surveillance procedure for the check and removal of accumulated water from the diesel generator day tanks lacked direction on reporting and trending. Although the diesel generator system manager reviews the results of chemistry analyses, the system manager is not notified upon the discovery of water. To address this, the monthly surveillance procedure was revised to require the initiation of a correction action program issue report and system manager notification upon the discovery of water during the monthly surveillance. Based on this issue, an extent of condition review identified additional fuel oil procedures which will be revised to require the initiation of an issue report and system manager notification upon the discovery of water.

This example provides objective evidence that opportunities for improvement of fuel oil activities are identified, evaluated for extent of condition, and implemented to ensure that adverse conditions are properly captured and trended.

2. In September 2012, the 0DO01T diesel fuel storage tank and associated day tank 0DO02T were drained, cleaned, and internally inspected. These tanks are uncoated. The internal surfaces of the tanks were identified as having no signs of corrosion.

This example provides objective evidence that fuel oil chemistry control and tank inspection activities are effectively implemented and that aging effects associated with fuel oil environments do not impact fuel oil storage tank intended functions.

3. In July 2010, and again in August 2013, Nuclear Oversight performed audits of the diesel fuel oil testing program. The objectives were to:

- Verify testing is performed on new and stored fuel oil to confirm that the oil properties meet the requirements of the program as specified by the Technical Specifications.
- Verify testing is performed as scheduled or based on events (i.e., new fuel receipt testing).
- Verify test results are reviewed and test discrepancies evaluated.

No deficiencies were identified in either audit.

This example provides objective evidence that audits are performed to determine the effectiveness of fuel oil program activities.

4. In September of 2009, the analysis results of new fuel oil for the 2DO01T diesel fuel storage tank indicated that the fuel oil passed the water and sediment test under ASTM D2709-96e, but failed the clear and bright appearance test under ASTM D4176-93. A corrective action program issue report was initiated. Engineering evaluated the acceptability of adding the new fuel oil to the storage tank. The water and sediment test was determined to be the more rigorous test, and would capture the percent volume of water that might be seen under the clear and bright appearance test. Based on this, it was concluded that the new fuel oil was acceptable for use.

This example provides objective evidence that test methods and acceptance criteria for fuel oil quality parameters are as invoked or referenced in the Technical Specifications and ASTM Standards. Fuel oil analysis not meeting the quality acceptance criteria are entered into the corrective action program for evaluation and the determination of corrective actions.

The operating experience relative to the Fuel Oil Chemistry program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of material. Appropriate guidance for evaluation is provided when nonconforming conditions are identified. Periodic audits of the Fuel Oil Chemistry program activities are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Fuel Oil Chemistry program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Fuel Oil Chemistry program will provide reasonable assurance that the loss of material aging effect will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.20 Reactor Vessel Surveillance

Program Description

The Reactor Vessel Surveillance aging management program is an existing condition monitoring program which manages the loss of fracture toughness of the reactor vessel and nozzles in a reactor coolant and neutron flux environment.

10 CFR Part 50, Appendix H requires that each nuclear plant have a reactor vessel material surveillance program to monitor changes in the fracture toughness properties of ferritic materials in the beltline region of the reactor vessel resulting from exposure to neutron irradiation and the thermal environment. Prior to 2003, LSCS complied with surveillance regulations by maintaining its own Appendix H program that complied with ASTM E 185.

In 2003, the NRC approved LSCS participation in the BWR Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP), as described in BWRVIP-78 and BWRVIP-86. The NRC approved Technical Specification Amendments 160 (Unit 1) and 146 (Unit 2) that permitted the use of the BWRVIP ISP for demonstrating compliance with the requirements of 10 CFR 50, Appendix H. The BWRVIP ISP was established as a program that combines surveillance materials from the existing programs and materials from the Supplemental Surveillance Program to make sufficient materials available to improve compliance with 10 CFR 50, Appendix H. Instead of using the plant-specific surveillance data from a given plant, the data from all BWR surveillance programs have been evaluated to select the “best” representative material to monitor radiation embrittlement for that plant. Selection of the best representative materials for a particular plant considers heat number, similar chemistries, common fabricator, and the availability of unirradiated data. In matching the available surveillance plates and welds, some capsule materials are good representatives for the limiting materials of multiple plants. The ISP results in a good representation of the limiting beltline materials for each plant, while reducing the number of capsules to be tested.

The BWRVIP ISP is described in BWRVIP-86-A. The NRC approved the use of BWRVIP-86-A in its Safety Evaluation Report dated February 1, 2002, as an acceptable alternative to all existing BWR plant-specific reactor vessel surveillance programs for compliance with 10 CFR 50, Appendix H. The BWRVIP ISP for license renewal is described in BWRVIP-116-A. The NRC approved the use of BWRVIP-116-A in its Safety Evaluation Report dated February 24, 2006, as an acceptable alternative to all existing BWR plant-specific reactor vessel surveillance programs for compliance with 10 CFR 50, Appendix H through the completion of each facility's proposed period of extended operation (60 year operating license). BWRVIP-86, Revision 1 includes the content of BWRVIP-116, the description of the BWRVIP ISP for license renewal, to provide a single, comprehensive implementation plan for the ISP during both the original and renewed license periods.

NUREG-1801 Consistency

The Reactor Vessel Surveillance aging management program is consistent with the ten elements of aging management program XI.M31, "Reactor Vessel Surveillance," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Reactor Vessel Surveillance program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. 10 CFR Part 50, Appendix H requires that each nuclear plant have a reactor vessel material surveillance program to monitor changes in the fracture toughness properties of ferritic materials in the beltline region of the reactor vessel resulting from exposure to neutron irradiation and the thermal environment. A materials surveillance program was developed and initiated at the beginning of nuclear operation at LSCS that was in conformance with the requirements of 10 CFR 50, Appendix H and complied with ASTM E 185. There were originally four surveillance capsules in each of the LaSalle reactors; capsules containing plate and weld metal were located at the 30, 120, and 300 degree azimuths, and there was also a neutron dosimeter located at the 30 degree azimuth. After the first cycle of operation, the 30 degree neutron dosimeter from each unit was removed and analyzed. After approximately six EFPY, the 300 degree capsule from each unit was removed and analyzed. This demonstrates the program is effectively providing materials data necessary for managing the effects of loss of fracture toughness due to neutron irradiation.

2. In 2003, the NRC approved LSCS participation in the BWR Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP), which is managed by EPRI/BWRVIP, as described in BWRVIP-78 and BWRVIP-86-A. The NRC approved Technical Specification Amendments 160 (Unit 1) and 146 (Unit 2) that permit using the BWRVIP ISP to demonstrate LSCS compliance with the requirements of 10 CFR 50, Appendix H. In 2007, a damaged spring was discovered on the Unit 2 120 degree capsule, so it was removed from the vessel at 15.44 EFPY cumulative exposure and it was placed in the spent fuel pool where it will remain indefinitely, since it does not require testing as part of the ISP. Participation in the ISP improves the reliability of the program in ensuring the reactor vessel reactor toughness is managed.

3. Since Unit 1 is a host plant for the ISP, the Unit 1 120 degree capsule was removed in January 2010 at 18.9 EFPY in support of the ISP. The plate and weld materials were tested and the results were published in report BWRVIP-250NP, "Testing and Evaluation of LaSalle Unit 1 120 degree Surveillance Capsule" and also in BWRVIP letter 2012-036, "Evaluation of the LaSalle Unit 1 120° Surveillance Capsule Data." As a result of the testing performed on the Unit 1 120 degree capsule weld material heat 1P3571, the Unit 1 Pressure-Temperature (P-T) curves were determined to be non-conservative for 32 EFPY. A corrective action program issue report was initiated and an operability evaluation was performed that determined the Unit 1 P-T curves remain valid for 21.0 EFPY, based on the GEH fluence methodology, while Unit 1 reached 21.6 EFPY in January 2013. Further evaluation based upon RAMA fluence methodology indicated the P-T curves remain valid for 26.5 EFPY. Updated P-T curves valid for 32 EFPY were submitted for NRC approval in December 2013. The issue was not applicable to Unit 2 because that reactor does not contain the 1P3571 weld material. This operating experience demonstrates that the program is providing the necessary materials data to determine the effects of neutron fluence on limiting reactor vessel materials. It also demonstrates that the program ensured that appropriate corrective and preventive actions were taken to revise the P-T curves and manage the loss of fracture toughness of reactor vessel materials.

The operating experience relative to the Reactor Vessel Surveillance program did not identify an adverse trend in performance. The fact that the surveillance capsule testing resulted in updated P-T limit curves demonstrates that the program is effective in ensuring that loss of fracture toughness due to neutron embrittlement is properly managed. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the Reactor Vessel Surveillance program will effectively identify potential degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing Reactor Vessel Surveillance program provides reasonable assurance that the loss of fracture toughness aging effect is adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.21 One-Time Inspection

Program Description

The One-Time Inspection program is a new condition monitoring program that will be used to verify the system-wide effectiveness of the Water Chemistry (B.2.1.2), Fuel Oil Chemistry (B.2.1.19), and Lubricating Oil Analysis (B.2.1.26) programs which are designed to prevent or minimize aging to the extent that it will not cause a loss of intended function during the period of extended operation. The program manages loss of material, cracking, and reduction of heat transfer in piping, piping components, piping elements, heat exchangers, and other components within the scope of license renewal. The program provides inspections focusing on locations that are isolated from the flow stream, that are stagnant, or have low flow for extended periods and are susceptible to the gradual accumulation or concentration of agents that promote certain aging effects. The inspections will include a representative sample of the system population and will focus on the bounding or lead components most susceptible to aging due to time in service, and severity of operating conditions. Twenty percent of the population with a maximum sample of 25 constitutes a representative sample size. A technical justification of the methodology used for determining sample size and for selecting components for inspection will be included in the One-Time Inspection Sample Basis Document. The program verifies either that unacceptable degradation is not occurring or triggers additional actions that will assure the intended function of affected components will be maintained during the period of extended operation.

The new One-Time Inspection program will be implemented prior to the period of extended operation. The one-time inspections will be performed within the 10 years prior to entering the period of extended operation.

NUREG-1801 Consistency

The One-Time Inspection aging management program is consistent with the ten elements of aging management program XI.M32, "One-Time Inspection," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience with detection of aging effects provide objective evidence that the One-Time Inspection program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In October 2012, ultrasonic (UT) examination of a nonsafety-related service water system pipe identified localized pitting where the wall thickness was below minimum wall thickness requirements. Design Engineering was contacted to evaluate the results of the inspection and the issue was entered into the corrective action program. The evaluation determined that the piping in its current condition would continue to meet its function of maintaining pressure boundary and maintaining structural integrity, could remain in service, but required replacement during the February 2013 refueling outage. This piping was replaced during the February 2013 outage.

This example provides objective evidence that a) non-destructive examination (NDE) is effective at identifying aging effects; and b) deficiencies found during NDE are documented in the corrective action program, evaluated for impact on system intended functions, and corrected.

2. In March 2012, ultrasonic (UT) examination of the safety-related 1A fuel pool emergency makeup pump suction piping identified localized pitting where the wall thickness was below the ASME code minimum wall thickness requirements. Design Engineering evaluated the results of the inspection and the issue was entered into the corrective action program. In 2009, UT was performed on the same location of the pipe and the results were acceptable. Utilizing the results from this previous inspection, the evaluation determined that the pitting was an active mechanism which would continue to reduce the pipe thickness at this location. Based on the rate of material loss, through-wall degradation was predicted to occur in approximately 2015. Since the piping had already reached its minimum wall thickness and had active pitting, it was concluded that this piping could no longer perform its design function. As a result, the affected fuel pool emergency makeup pump suction piping and the 1A fuel pool emergency makeup pump were isolated from service and subsequently replaced.

This example provides objective evidence that a) non-destructive examination (NDE) is effective at identifying aging effects; and b) deficiencies found during NDE are documented in the corrective action program, evaluated for impact on system intended functions, and corrected.

3. In April 2006, visual internal inspection of the raw water side of a cubical cooler identified fouling due to accumulated mud/silt and corrosion nodules. This issue was entered into the corrective action program and it was determined that the operability of the cooler was not affected by the mud/silt and corrosion nodules. As a result of the inspection, the cooler was cleaned and returned to service. Post-cleaning tests indicated that the cleaning was successful as evidenced by a reduction in differential pressure across the cooler.

This example provides objective evidence that a) visual inspections are effective at identifying fouling in heat exchangers/coolers; and b) deficiencies found during visual inspections are documented in the corrective action program, evaluated for impact on system intended functions, and corrected.

The operating experience relative to the One-Time Inspection program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the One-Time Inspection program will be effective in verifying the effectiveness of the Water Chemistry (B.2.1.2), Fuel Oil Chemistry (B.2.1.19), and Lubricating Oil Analysis (B.2.1.26) aging management programs.

Conclusion

The new One-Time Inspection program will provide reasonable assurance that the identified aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.22 Selective Leaching

Program Description

The Selective Leaching aging management program is a new condition monitoring program which ensures the integrity of the components that may be susceptible to loss of material due to selective leaching by demonstrating the absence of selective leaching. Susceptible materials are gray cast iron and copper alloy with greater than 15 percent zinc. Service environments of susceptible components within the scope of license renewal include raw water, closed cycle cooling water, treated water, waste water, and soil. There are no aluminum bronze in scope components with greater than eight percent aluminum in any environment. The aging management program includes visual examination, supplemented by hardness measurement or other appropriate examination methods, of a representative sample of components to determine whether loss of material by the preferential removal of one of the alloying elements from a material in an aqueous environment is occurring.

Inspections will be performed on a representative sample of the susceptible components and will focus on the bounding or lead components most susceptible to aging due to time in service, severity of operating conditions, and other bounding conditions. Twenty percent of the population with a maximum sample of 25 for each susceptible material and environment combination constitutes a representative sample size. A technical justification of the methodology and sample size used for selecting components for inspection will be defined in the Selective Leaching Inspection Sample Basis Document. If selective leaching is found, the program will require an evaluation of the aging effect on the ability of the affected components to perform their intended function(s) during the period of extended operation. The sample size for each material and environment combination group may be expanded based on the results of the evaluation and laboratory testing. This confirmatory condition monitoring program will provide adequate inspection methods that are effective in demonstrating the absence of selective leaching.

The selective leaching process involves the preferential removal of one of the alloying elements from the material, which leads to the increased concentration of the remaining alloying elements. Dezincification (loss of zinc from brass) and graphitization (removal of iron from cast iron) are examples of such a process. Susceptible materials, high temperatures, stagnant-flow conditions, and a corrosive environment, such as acidic solutions for brasses with high zinc content and dissolved oxygen, are conducive to selective leaching. These environmental and material conditions are considered when choosing samples for inspection.

In treated water and closed cycle cooling water environments, chemistry is monitored in accordance with the Water Chemistry (B.2.1.2) and Closed Treated Water Systems (B.2.1.13) aging management programs to control corrosive contaminants and pH minimizing dissolved oxygen. In some cases corrosion-inhibiting additives are used. These activities are considered effective in reducing the occurrence of selective leaching.

The new Selective Leaching program will be implemented prior to the period of extended operation. One-time inspections for selective leaching will be conducted within the five years prior to entering the period of extended operation.

NUREG-1801 Consistency

The Selective Leaching aging management program will be consistent with the ten elements of aging management program XI.M33, "Selective Leaching," specified in NUREG-1801, as modified by LR-ISG-2011-03 and LR-ISG-2012-02.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following operating experience review provides objective evidence that the Selective Leaching program will be effective in assuring that intended functions are maintained consistent with the current licensing bases during the period of extended operation:

1. The Selective Leaching program is a new program for LSCS. Industry operating experience that forms the basis for this program is included in the operating experience element of the corresponding NUREG-1801 aging management program descriptions. Plant-specific operating experience was reviewed to ensure that the operating experience discussed in the NUREG-1801 Chapter XI.M33 Selective Leaching aging management program is bounding (i.e., that there is no relevant plant-specific operating experience in addition to that described in NUREG-1801). The LSCS corrective action program and component history databases were searched to determine if selective leaching has been identified to date for components in the applicable material and environment combinations. In addition, the failure analysis database of the Exelon Power Labs (the research facility which performs detailed failure and metallurgical analyses for Exelon nuclear facilities) was researched to determine if selective leaching has been identified for components at LSCS. No occurrences of selective leaching were identified in an extensive search of LSCS historical information and operating experience.

A review of operating experience did not identify any occurrences of selective leaching. Therefore, a one-time inspection to confirm that selective leaching is not occurring in susceptible components is appropriate. The review of plant-specific operating experience has confirmed that the operating experience described in the NUREG-1801 Chapter XI.M33 Selective Leaching program is bounding and, therefore, the inspection techniques recommended are adequate to ensure that selective leaching is not occurring on susceptible components within the scope of license renewal. Appropriate guidance for evaluation, repair, or replacement is provided for locations where selective leaching is found. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Selective Leaching program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The new Selective Leaching program will provide reasonable assurance that the loss of material aging effect will be adequately managed to either demonstrate the absence of selective leaching or, if selective leaching is identified, take appropriate corrective actions to ensure that intended functions are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.23 One-time Inspection of ASME Code Class 1 Small-Bore Piping

Program Description

The One-time Inspection of ASME Code Class 1 Small-Bore Piping aging management program is a new conditioning monitoring program that will manage cracking of piping in a reactor coolant environment. The program will perform one-time inspection of a sample of ASME Code Class 1 piping less than nominal pipe size (NPS) 4-inches and greater than or equal to NPS 1-inch. The program includes pipes, fittings, branch connections, and full penetration (butt) welds and partial penetration (socket) welds. Cracking of ASME Code Class 1 small-bore piping due to stress corrosion cracking, cyclical (including thermal, mechanical, and vibration fatigue) loading, thermal stratification or thermal turbulence has not been experienced at LSCS Units 1 and 2. Therefore, this one-time inspection program is applicable and adequate to manage this aging effect during the period of extended operation. Program inspections will augment ASME Code, Section XI requirements.

For the current third 10-year interval, the ISI program applies the requirements of ASME Code, Section XI, 2001 Edition through 2003 Addenda, and Risk Informed Inservice Inspection (RISI) alternative requirements to Examination Categories for Class 1 welds as approved by relief request. Any deviation from ASME Code, Section XI requirements must be approved by the NRC per a relief request. The current ISI program for the third 10-year interval includes periodic volumetric ultrasonic testing of selected Class 1 small-bore piping butt welds. The One-time Inspection of ASME Code Class 1 Small-Bore Piping program will also include inspection of socket welds using a volumetric examination technique demonstrated to be capable of detecting cracking. If such a volumetric examination technique is not available by the time of the inspections, the examination method will be by destructive examination. If destructive examinations are performed, each examination will be credited as equivalent to two volumetrically examined socket welds.

Units 1 and 2 have been operating for more than 32 years and 31 years, respectively, at the time of the license renewal application submittal, and have not experienced cracking of ASME Code Class 1 small-bore piping due to stress corrosion, cyclical (including thermal, mechanical, and vibration fatigue) loading, or thermal stratification and thermal turbulence. The inspection sample size will include at least 3 percent of the population of program butt welds with a maximum of 10 program butt welds for each LSCS unit, and at least 3 percent of the population of program socket welds with a maximum of 10 program socket welds for each LSCS unit. This methodology results in 1 butt weld on each unit, and 10 socket welds on each unit selected for one-time inspection. This ensures an adequate sample size to provide confidence that the aging effect of cracking is not an issue at LSCS. Sample locations will be selected based on susceptibility for cracking due to stress corrosion cracking and fatigue, consequence of failure, inspectability, dose considerations, operating experience, and limiting locations of the total population of ASME Code Class 1 small-bore piping locations.

The program includes controls to implement an alternate plant-specific periodic inspection aging management program should evidence of ASME Class 1 small-bore piping cracking caused by intergranular stress corrosion cracking (IGSCC) or fatigue be revealed by review of LSCS operating experience prior to the period of extended operation, or by the examinations performed as part of this program.

The program also includes controls to direct that if ASME Class 1 small-bore piping in a particular plant system experiences cracking, small-bore piping in all Class 1 plant systems shall be evaluated to determine whether the cause for the cracking affects those other systems.

The new One-time Inspection of ASME Code Class 1 Small-Bore Piping program will be implemented prior to the period of extended operation. One-time inspections will be performed within the six years prior to entering the period of extended operation.

NUREG-1801 Consistency

The One-time Inspection of ASME Code Class 1 Small-Bore Piping aging management program will be consistent with the ten elements of aging management program XI.M35, "One-time Inspection of ASME Code Class 1 Small-Bore Piping," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the One-time Inspection of ASME Code Class 1 Small-Bore Piping program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. An extensive review of plant operating experience was performed to determine if Units 1 or 2 have experienced cracking of ASME Code Class 1 small-bore piping caused by IGSCC or fatigue during their operating history. The review included a key word search of the corrective action program database going back to January 2001, a review of correspondence to the NRC going back to 1982, and interviews with the LSCS ISI program owner for input as to whether cracking of Class 1 small-bore piping had occurred. The review did not identify any issues where cracking of ASME Code Class 1 small-bore piping caused by IGSCC or fatigue occurred during the operating history. The review identified two issues with welds during start-up in 1983, one preservice plugs-type weld issue in 1986, and a pinhole leak identified in a Class 1 socket weld in 2005. The pinhole leak was between the body of a valve and a drain line of the main steam system, and the cause evaluation concluded that the pinhole leak was caused by a weld inclusion or defect due to porosity following repairs performed in 1995, and not cracking.

This example provides objective evidence that the measures in place to prevent cracking of ASME Code Class 1 small-bore piping caused by IGSCC and fatigue, including the design of the plant piping systems to prevent cracking caused by fatigue and effective water chemistry controls to prevent IGSCC, have been effective

2. Periodic volumetric examinations of ASME Code Class 1 small-bore piping butt welds and visual external surface examinations of ASME Code Class 1 small-bore piping socket welds have been performed in accordance with the Risk Informed ISI program since 2002 on Unit 1, and 2003 on Unit 2, with no unacceptable examination results. Prior to 2002, ASME Code Class 1 small-bore piping butt welds and socket welds received periodic visual external surface examination per ASME Code, Section XI, Table IWB-2500-1 Examination Category B-J, Item Nos. B9.21 and B9.40. With the exception of the pinhole leak identified in a Class 1 socket weld, described in OE example 1, there were no unacceptable examination results.

This example provides objective evidence that the measures in place to prevent cracking of ASME Code Class 1 small-bore piping caused by IGSCC and fatigue, including the design of the plant piping systems to prevent cracking caused by fatigue and effective water chemistry controls to prevent IGSCC, have been effective.

3. In 1986, two welds on Unit 1 that were later within the scope of NRC GL 88-01, had flaws identified using volumetric examination. In 1990, the crowns on these welds were machined, and subsequent volumetric examination characterized these as root geometry indications, not IGSCC cracks. There are currently no welds within the ASME Code Class 1 boundary that have cracks.

This example illustrates how implementation of volumetric examination was applied to identify minor indications that could be indicative of cracks in piping welds.

The operating experience relative to the new One-time Inspection of ASME Code Class 1 Small-Bore Piping program did not identify an adverse trend in performance. A review of LSCS specific operating experience and ISI inspections performed per ASME Section XI and the current ISI program indicates that cracking of ASME Code Class 1 small-bore piping caused by IGSCC or fatigue has not occurred. The inspection methods being implemented by the existing ISI program have been proven effective in detecting cracking. The expanded scope of inspection and improved inspection methods implemented by the new One-time Inspection of ASME Code Class 1 Small-Bore Piping program will further improve the effectiveness of the ISI program to manage the aging effect of cracking. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that the implementation of the One-time Inspection of ASME Code Class 1 Small-Bore Piping program will effectively identify cracking prior to loss of intended function during the period of extended operation.

Conclusion

The new One-time Inspection of ASME Code Class 1 Small-Bore Piping program will provide reasonable assurance that the aging effect of cracking will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.24 External Surfaces Monitoring of Mechanical Components

Program Description

The External Surfaces Monitoring of Mechanical Components aging management program is a new condition monitoring program that directs visual inspections of external surfaces of components be performed during system inspections and walkdowns. The program consists of periodic visual inspection of metallic and elastomeric components such as piping, piping components, ducting, and other components within the scope of license renewal exposed to air–indoor uncontrolled, air–outdoor, and condensation environments. The program manages the aging effects of cracking, hardening and loss of strength, loss of material, and reduced thermal insulation resistance of metallic and elastomeric materials through visual inspection of external surfaces for evidence of loss of material, cracking, and changes in material properties. When appropriate for the component and material, visual inspections are supplemented by physical manipulation to detect hardening and loss of strength of elastomers.

The External Surfaces Monitoring of Mechanical Components program includes visual inspection of the metallic jacketing on thermal insulation to ensure that the jacketing is performing its function to protect the insulation from damage, such as in-leakage of moisture that could reduce the thermal resistance of the insulation.

The program includes periodic representative inspection of outdoor insulated components except tanks; and indoor insulated components and tanks where the process fluid temperature is below the dew point. The inspections require removal of insulation to detect loss of material due to corrosion under the insulation. These inspections will be conducted during each 10-year period of the period of extended operation. The representative sample includes 20 percent of the piping length or 20 percent of the surface area for components other than piping for each material type. Alternatively, 25 components or 25 one-foot axial length sections of piping may be inspected for each material type. Inspections are conducted for each external environment where condensation or moisture on the surfaces of the component could occur routinely or seasonally.

For indoor tanks, the representative inspection includes 20 percent of the surface area or 25 one-square-foot sections. The inspection areas will be distributed to include tank domes, sides, near bottoms, at points where structural supports or instrument nozzles penetrate the insulation and where water is most likely to collect.

If the initial representative inspection verifies no loss of material beyond that which could have been present during initial construction, then subsequent inspections will consist of inspection of the external surface of the insulation for indications of damage or evidence of water intrusion through the insulation to the component surface. If insulation damage or evidence of water intrusion through the insulation is identified, then periodic inspection of the component surface under the insulation will continue.

The program does not require removal of tightly-adhering insulation that is impermeable to moisture unless there is evidence of damage to the moisture barrier. Instead, the program includes visual inspection of the entire accessible population of piping and components during each 10-year period of the period of extended operation.

Materials of construction inspected under this program include aluminum, carbon steel, ductile cast iron, elastomers, gray cast iron, galvanized steel, and stainless steel. Examples of components this program inspects are piping and piping elements, ducting, heat exchangers, tanks, pumps, compressors, insulation jacketing, and other components. The parameters monitored by visual inspection for metallic components will include evidence of rust, corrosion, and material wastage; leakage from or onto external surfaces; worn, flaking, or oxide-coated surfaces; corrosion stains, deterioration, or damage of thermal insulation; cracking, flaking, and blistering of protective coatings; and leakage for detection of cracks on the external surfaces of stainless steel components exposed to an outdoor air environment. The parameters monitored by visual and tactile inspections for elastomeric components will include surface cracking, crazing, scuffing, dimensional change (e.g. “ballooning” and “necking”); discoloration; exposure of internal reinforcement for reinforced elastomers; and hardening as evidenced by a loss of suppleness during manipulation where the component and material are appropriate for manipulation.

Inspections, with the exception of inspections performed to detect corrosion under insulation, are performed at a frequency not to exceed one refueling cycle. This frequency accommodates inspections of components that may be in locations that are normally only accessible during outages. Surfaces that are not readily visible during plant operations and refueling outages are inspected when they are made accessible and at such intervals that would ensure the components' intended functions are maintained. Inspections performed to detect corrosion under insulation will be conducted during each 10-year period of the period of extended operation.

Any visible evidence of degradation will be evaluated for acceptability of continued service. Acceptance criteria will be based upon component, material, and environment combinations. Deficiencies will be documented and evaluated under the corrective action program.

The external surfaces of components that are buried are inspected via the Buried and Underground Piping (B.2.1.28) program. The external surfaces of aboveground tanks are inspected via the Aboveground Metallic Tanks (B.2.1.18) program. This program does not provide for managing aging of internal surfaces. The new External Surfaces Monitoring of Mechanical Components program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The External Surfaces Monitoring of Mechanical Components aging management program will be consistent with the ten elements of aging management program XI.M36, "External Surfaces Monitoring of Mechanical Components," specified in NUREG-1801, as modified by LR-ISG-2011-03 and LR-ISG-2012-02.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the External Surfaces Monitoring of Mechanical Components program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. During a walkdown of the Unit 2 service air system by the system manager in 2009, moisture was noted to be leaking from a valve in the area, causing material degradation to the equipment below it. This condition was entered into the corrective action program for followup action. Followup actions included an engineering assessment of the material condition, and scheduling of a repair prior to loss of intended function of the affected components. This example provides objective evidence that the visual inspections performed in system manager walkdowns, which will be utilized for the External Surfaces Monitoring of Mechanical Components program, are effective in identifying degraded conditions of metallic components; and that the corrective action program is effectively used to assess and monitor degraded conditions which are identified and to perform corrective actions when appropriate.

2. During operator rounds in 2008, a leaking service water pipe was identified in the Lake Screen House. The condition was entered into the corrective action program for evaluation. An equipment apparent cause evaluation was performed, and it was determined that the leak was the result of through-wall corrosion of the piping. Water had accumulated on the Lake Screen House floor, which wet the piping insulation and in turn caused the piping to corrode. An extent of condition review was performed, inspections were performed on other insulated piping in environments with similar wetting conditions, and repairs were made as appropriate. In addition, actions were created to address the source of the water accumulation that caused the condition. This example provides objective evidence that external visual inspections are capable of identifying loss of material, and that the corrective action program is an effective tool for evaluating degraded conditions, addressing the extent of condition, and establishing appropriate corrective actions.

3. During a walkdown of a Unit 2 ventilation system by the system manager in 2003, the flexible connections between two ventilation fans and the ductwork were observed to be degraded due to aging, and in need of replacement. This condition was entered into the corrective action program for followup action. Work orders were created and the flex connections were replaced. This example provides objective evidence that the visual inspections performed in system manager walkdowns, which will be utilized for the External Surfaces Monitoring of Mechanical Components program, are effective in identifying degraded conditions of elastomers; and that the corrective action program is effectively used to correct degraded conditions which are identified.

4. During a walkdown of a Unit 1 ventilation system by the system manager in 2003, a valve from an adjacent piping system was noted to be leaking. This condition was entered into the corrective action program for followup action. A work order was created and the valve was reworked to correct the leak. This example provides objective evidence that the visual inspections performed in system manager walkdowns, which will be utilized for the External Surfaces Monitoring of Mechanical Components program, are effective in identifying leaking components which may cause degradation to surrounding components; and that the corrective action program is effectively used to correct degraded conditions which are identified.

The operating experience relative to the External Surfaces Monitoring of Mechanical Components program illustrates that the program will be effective in identifying and managing applicable aging effects. The inspection methods being implemented by the program have been proven effective in detecting aging effects including hardening and loss of strength and loss of material. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the External Surfaces Monitoring of Mechanical Components program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The new External Surfaces Monitoring of Mechanical Components program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.25 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

Program Description

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components aging management program is a new condition monitoring program that manages the applicable aging effects by directing visual inspections of internal surfaces of components within the scope of license renewal be performed when they are made accessible during periodic system and component surveillances or during the performance of maintenance activities. The program provides assurance that condensation, diesel exhaust, and waste water environments are not causing material degradation that could result in loss of intended function.

The program consists of visual inspections of the internal surfaces of metallic components such as piping, piping components and piping elements, ducting components, tanks, heat exchangers components, and other components that are exposed to condensation, diesel exhaust, and waste water. The program also consists of visual inspections of the internal surfaces of elastomeric components that are exposed to condensation, supplemented by physical manipulation to detect hardening or loss of strength where appropriate. The program will manage the aging effects of loss of material, reduction of heat transfer, and cracking for metallic components. The program will also manage the aging effects of loss of material, hardening and loss of strength, and change in material properties for elastomeric components. The program includes provisions for visual inspections of the internal surfaces of components not managed under other aging management programs.

Acceptance criteria for each component and aging effect combination are defined to ensure that the need for corrective actions is identified before the loss of intended functions. For metallic surfaces, any abnormal surface condition is evaluated by engineering. For stainless steel surfaces, a clean, shiny surface is expected. For flexible polymers, changes in material properties (e.g., hardness, flexibility, physical dimensions, and color) and cracks are evaluated. For rigid polymers, surface changes affecting performance such as erosion and cracking are evaluated.

At a minimum, in each 10-year period during the period of extended operation, a representative sample of 20 percent of the population (defined as components having the same combination of material, environment, and aging effect) or a maximum of 25 components per population will be inspected. Where practical, the inspections will focus on the bounding or lead components most susceptible to aging because of time in service and severity of operating conditions. Opportunistic inspections will continue in each period even after meeting the sampling limit.

A review of LSCS operating experience has revealed instances of recurring internal corrosion in plant floor drain piping that is within the scope of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. This program will include periodic inspections on this population of carbon steel piping in the floor drain systems to ensure that recurring aging effects are adequately managed.

The new Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components aging management program will be consistent with the ten elements of aging management program XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," specified in NUREG-1801, as modified by LR-ISG-2012-02.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. During a maintenance activity in 2005, which provided access to the internal surfaces of a control room ventilation air cooled condenser, inspection of the accessible area revealed that the heating coils were dirty and in need of cleaning. This condition was entered into the corrective action program, a work order was generated, and the coils were cleaned. This example provides objective evidence that the visual inspections performed during maintenance activities, when access to internal surfaces is made available, are effective in identifying degraded conditions indicative of reduction in heat transfer of heat exchanger components; and that the corrective action program is effectively used to correct degraded conditions which are identified.

2. During a maintenance activity in 2009, which provided access to the primary containment chiller condenser internal surfaces, corrosion of a drain plug was identified. This condition was entered into the corrective action program, and was repaired under an existing work order. This example provides objective evidence that the visual inspections performed during maintenance activities, when access to internal surfaces is made available, are effective in identifying degraded conditions caused by loss of material; and that the corrective action program is effectively used to correct degraded conditions which are identified.

3. A review of LSCS operating experience over a 10-year period has revealed recurring internal corrosion on the plant drainage piping system, specifically the carbon steel and waste water population. In response to this aging effect, this program will perform targeted inspections of this material and environment population during each 10-year period, which will ensure that the applicable aging effects are effectively managed during the period of extended operation. These inspections for recurring internal corrosion meet the guidance provided in LR-ISG-2012-02. This example provides objective evidence that Interim Staff Guidance is reviewed and incorporated into aging management programs.

The operating experience relative to the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program indicates that the inspection methods that will be implemented by the program will be effective in detecting aging effects including cracking, hardening and loss of strength, loss of material and reduction of heat transfer. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The new Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.26 Lubricating Oil Analysis

Program Description

The Lubricating Oil Analysis aging management program is an existing condition monitoring program that provides monitoring of oil condition to manage loss of material and reduction of heat transfer in piping, piping components, piping elements, heat exchangers, and tanks within the scope of license renewal exposed to a lubricating oil environment. Sampling, analysis, and condition monitoring activities identify specific wear products and verify that the contamination levels (primarily water and particulates) and the physical properties of lubricating oil are maintained within acceptable limits to ensure that component intended functions are maintained.

The program directs condition monitoring activities (sampling, analyses, and trending), thereby preserving an environment that is not conducive to loss of material or reduction of heat transfer. The lubricating oil testing (sampling and analysis) and condition monitoring activities identify detrimental contaminants such as water, sediments, specific wear elements, and elements from an outside source. The contaminant levels (e.g., water and particulates) are trended in the program's database, and recommendations are made when adverse trends are observed, which could include in-leakage and corrosion product buildup.

The Lubricating Oil Analysis program applies monitoring methods that are effective in detecting the applicable aging effects and the frequency of monitoring is adequate to prevent significant degradation.

NUREG-1801 Consistency

The Lubricating Oil Analysis aging management program is consistent with the ten elements of aging management program XI.M39, "Lubricating Oil Analysis," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Lubricating Oil Analysis program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 2012, a corporate check-in self-assessment was performed where each station Component Maintenance Optimization (CMO) Group performed an assessment of their lubricating oil analysis program utilizing the assessment

template.

For LSCS, the results of this check-in self-assessment demonstrated that the site's lubricating oil analysis program is in compliance with the corporate procedures and objectives, and the procedures and processes are employed effectively such that equipment reliability is strongly supported with regard to lubrication handling and sample analysis.

Some specific observations noted during the check-in self-assessment are listed below.

- Lubrication products are well controlled, and follow a stringent labeling process to prevent cross contamination and errors of application for machinery.

- Oil is filtered prior to use in the plant to reduce particulate and potential long term wear of bearings. The focus on filtering has resulted in meeting stringent requirements for turbine oil, electro-hydraulic control (EHC) fluid, and to exceed general equipment oil cleanliness standards. It has also prevented equipment failure and long term wear.

- Training and qualifications for those individuals that sample and change the oil are appropriate for the task. Individuals performing analysis are trained and have the support of vendors and peers within the Exelon fleet to review their evaluations of sample or test results.

- Processes for sampling, handling, and analysis of lubrication are solid, providing assurance that problems with machinery can be avoided or identified early enough to implement correction actions in a timely fashion.

This example provides objective evidence that periodic assessments of the lubricating oil analysis program are performed to identify the areas that may need improvement to maintain the quality performance of the program.

2. In May 2010, the lubricating oil analysis for the 'A' diesel fire pump engine trend indicated an increase in wear particle count (WPC). A corrective action program issue report was initiated. A direct reading ferrograph instrument was used to measure WPC which is the sum of large particles (Dl) of five to 10 micron size plus small particles (Ds) of less than five micron size. The WPC value of 104 placed the 'A' diesel fire pump engine above the expected WPC value of 100. In the same month, maintenance performed an oil flush and change-out of the lubricating oil for the 'A' diesel fire pump engine. In November 2010, the lubricating oil was sampled and analyzed, and again identified a high WPC. The lubricating oil analysis also indicated higher than expected levels of iron and lead which are typically associated with cylinder, bearing, or bushing wear. Analytical ferrography was performed which validated the lubricating oil analysis sample results. In December 2010, maintenance overhauled this engine, and performed another oil flush and change-out of the lubricating oil for the 'A' diesel fire pump engine. Subsequent lubricating oil sampling and analyses for the 'A' diesel fire pump engine have demonstrated acceptable WPC values, and a decreasing trend in WPC.

This example provides objective evidence that the Lubricating Oil Analysis program manages effective sampling for critical lubricating oil parameters, and results in detection of potential conditions adverse to quality and appropriate actions to correct the conditions. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence.

3. In August 2007, lubricating oil analysis of the ‘B’ diesel fire pump engine identified contamination particulates present consisting of small ferrous wear particles, copper wear particles, iron oxide, and sealant material. A corrective action program issue report was initiated. Chemical analysis further indicated a higher level of sodium than normal suggesting the presence of engine coolant in the lube oil. For confirmation, a sample of the lubricating oil was analyzed by an independent laboratory, and their report cited a fairly low concentration of small steel rubbing wear particles, most less than 10 microns in size, as well as a few small steel spherical particles and scuffing wear particles.

The ‘B’ diesel fire pump engine was rebuilt in May 2007, and the data suggested that the most probable cause of the introduction of oil contamination particulates occurred during the post-maintenance run after the rebuild. To reduce the contamination particulates and assure that no significant wear was occurring, the Component Maintenance Optimization (CMO) group recommended flushing and changing the lubricating oil, and replacing the oil filter of the ‘B’ diesel fire pump engine. CMO group further recommended that oil changes occur immediately after an engine run to assure contamination particles were in suspension in the lubricating oil. Subsequent lubricating oil analysis results for the ‘B’ diesel fire pump engine have been satisfactory, ruling out significant wear as the cause of the contamination particulates noted in the original analysis.

This example provides objective evidence that the Lubricating Oil Analysis program manages effective sampling for critical lubricating oil parameters, and results in resolving potential conditions adverse to quality by implementing appropriate actions to correct the condition.

The operating experience relative to the Lubricating Oil Analysis program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of material and reduction of heat transfer. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Lubricating Oil Analysis program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the Lubricating Oil Analysis program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing Lubricating Oil Analysis program provides reasonable assurance that the loss of material and reduction of heat transfer aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.27 Monitoring of Neutron-Absorbing Materials Other Than Boraflex

Program Description

The Monitoring of Neutron-Absorbing Materials Other Than Boraflex aging management program is an existing condition monitoring program that includes periodic inspection and analysis of test coupons of the neutron-absorbing material in the spent fuel storage racks to determine if the neutron-absorbing capability of the material has degraded in a treated water environment. This program ensures that a five percent sub-criticality margin in the spent fuel pool is maintained during the period of extended operation by monitoring for loss of material, changes in dimension, and loss of neutron-absorption capacity of the material. The neutron-absorbing material in the Unit 1 spent fuel storage racks is Boral. Netco inserts have been installed in the Unit 2 spent fuel storage racks, utilizing Rio Tinto Alcan composite as the neutron-absorbing material.

The Monitoring of Neutron-Absorbing Materials Other Than Boraflex program includes monitoring of changes in physical characteristics of the material in the spent fuel storage racks through visual inspections, dimensional measurements, neutron-attenuation testing, and weight and specific gravity measurements of test coupons. Results from each coupon surveillance are documented and retrievable for purposes of trending. Acceptance criteria thresholds are established as indicators of potential adverse trends in the condition of the neutron-absorbing material to ensure corrective actions are taken prior to compromising the five percent sub-criticality margin as contained within the spent fuel pool criticality analysis.

NUREG-1801 Consistency

The Monitoring of Neutron-Absorbing Materials Other Than Boraflex aging management program will be consistent with the ten elements of aging management program XI.M40, "Monitoring of Neutron-Absorbing Materials Other Than Boraflex," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancement will be implemented in the following program element:

1. Maintain the test coupon exposure such that it is bounding for the neutron-absorbing material in all spent fuel racks, by relocating the coupon tree to a different spent fuel rack cell location each cycle and by surrounding the coupons with a greater number of freshly discharged fuel assemblies than that of any other cell location. **Program Element Affected: Monitoring and Trending (Element 5)**

Operating Experience

The following examples of operating experience provide objective evidence that the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. Boral coupons were removed from the Unit 1 spent fuel pool and analyzed in 2004 and 2009. Inspections of the coupons included visual examination for evidence of blistering and pitting; length, width, and thickness measurements; neutron-attenuation testing for boron-10 content; and weight and specific gravity measurements. Results from each post-irradiated coupon surveillance were compared to the original pre-irradiated data for evidence of blistering, swelling (bulging), loss of material, and decrease in boron-10 areal density to determine if there has been any loss of neutron-absorption capability, and it was confirmed that no significant deterioration or degradation had occurred. This example provides objective evidence that the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program effectively monitors the parameters that are indicators of the ability of the Boral to perform its intended function. The existing program contains acceptance criteria that will identify adverse trends in the ability of the Boral material to absorb neutrons prior to a loss of intended function to ensure the assumptions in the spent fuel pool criticality analysis remain valid.

2. Netco insert coupons for the fast start program were removed from the Unit 2 spent fuel pool and analyzed in 2009 and 2013. Inspections of the coupons included visual examination for evidence of blistering and pitting; length, width, and thickness measurements; neutron-attenuation testing for boron-10 content; and weight and specific gravity measurements. Results from each post-irradiated coupon surveillance were compared to the original pre-irradiated data for evidence of blistering, swelling (bulging), loss of material, and decrease in boron-10 areal density to determine if there has been any loss of neutron-absorption capability, and it was confirmed that no significant deterioration or degradation had occurred. This example provides objective evidence that the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program effectively monitors the parameters that are indicators of the ability of the Netco inserts to perform their intended function. The existing program contains acceptance criteria that will identify adverse trends in the ability of the material to absorb neutrons prior to a loss of intended function to ensure the assumptions in the spent fuel pool criticality analysis remain valid.

3. The spent fuel storage racks in the Unit 2 fuel pool were equipped with Boraflex as the intended neutron-absorbing material. Condition monitoring of the Boraflex material was performed by periodic coupon testing and analysis, and revealed degradation over time. Corrective actions were taken in response to monitoring results, which included in-situ areal density measurements, fuel pool criticality analyses, and administrative limitations on use of cell locations as short-term actions. The long-term corrective action was to install an alternate neutron-absorbing material. A modification was performed to install Netco inserts, which utilize Rio-Tinto Alcan composite as the neutron-absorbing material, in each fuel storage rack cell location. As a

result, Boraflex is no longer credited as the neutron-absorbing material. A condition monitoring program is in place for the new Netco inserts. This example provides evidence that the corrective action program is an effective program for monitoring and evaluating degraded conditions, and implementing corrective actions in response to degraded conditions.

The operating experience relative to the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program has not identified an adverse trend in performance of the current neutron-absorbing materials. The inspection methods being implemented by the program are effective in detecting aging effects including reduction of neutron absorbing capacity; change in dimensions and loss of material. Appropriate guidance for corrective action is provided for instances when degradation is found. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Monitoring of Neutron-Absorbing Materials Other Than Boraflex program will provide reasonable assurance that the reduction of neutron absorbing capacity, change in dimensions, and loss of material aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.28 Buried and Underground Piping

Program Description

The Buried and Underground Piping aging management program is an existing preventive, mitigative, and condition monitoring program that manages the external surface aging effects of cracking and loss of material for buried and underground piping in soil and air–outdoor environments. The program manages aging through preventive, mitigative, and inspection activities for piping and components within the scope of license renewal. The Buried and Underground Piping program includes preventive and mitigative techniques, such as external coatings for external corrosion control, the application of cathodic protection, and the quality of backfill utilized. External coatings are in accordance with NACE standards. Coal tar epoxy coatings, specifically, are specified to meet the requirements of Government Specification MIL-P-23236, Type 1, Class 2 and Corps of Engineers Specification C-200. The program also relies on periodic inspection activities, including visual examination of buried and underground piping, and electrochemical verification of the effectiveness of the cathodic protection system. Directed inspections of buried and underground piping are planned based on categorization criteria contained in LR-ISG-2011-03, “Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2, Aging Management Program XI.M41, ‘Buried and Underground Piping and Tanks’.” Buried and underground piping are opportunistically inspected by visual means whenever they become accessible.

In assessing and verifying the effectiveness of the cathodic protection system, soil corrosion probe assemblies may also be used to verify the effectiveness during annual surveys. Data from the soil corrosion probe assemblies may also be used to evaluate cathodic protection effectiveness at locations already assessed by existing conventional test points. Placement of the soil corrosion probe assemblies will be in close proximity to the buried pipe of interest and consider factors such as existing soil sampling data (e.g., moisture content, pH, and resistivity measurements), the location of the nearest anode beds, proximity of the buried in scope piping of interest and respective existing test points to the anode beds, and adjacent site features (e.g., exposed large surface area tank bottoms, heavily congested areas of other buried piping, adjacent large diameter piping) which could affect the measurements taken from both the existing test points and the soil corrosion probe assemblies. Factors such as cathodic shielding and structures or components serving as large current collectors will be considered when evaluating the effects of adjacent site features. Cathodic protection may be proven effective by soil corrosion probe assemblies during the annual cathodic protection survey based on observations of less than one mil per year material loss from the probe, or a remaining life calculation demonstrating the component intended function will be maintained through the period of extended operation. The remaining life calculation methodology may only be used when the pipe being assessed was volumetrically examined at the time the soil corrosion probe assembly was installed. Information provided in National Association of Corrosion Engineers (NACE) Internal Publication 05107, “Report on Corrosion Probes in Soil or Concrete” will be considered during the application, installation, and use of soil corrosion probe assemblies. Additional specific details on the installation and use of the probes will be in accordance with vendor, manufacturer, and NACE qualified cathodic protection expert (i.e., NACE CP4, “Cathodic Protection Specialist” qualification) recommendations.

The Fire Protection System was installed in accordance with National Fire Protection Association (NFPA) Standard 24. Aging management of the buried Fire Protection System piping will be accomplished through monitoring the activity of the intermediate jockey pump. Upon automatic start of the intermediate jockey pump on low system header pressure, an alarm is received in the control room. This alarm prompts operator actions to dispatch operations personnel to determine the cause of the low fire protection system header pressure. Therefore, directed inspections of fire protection piping are not required.

There are no buried or underground tanks within the scope of license renewal.

The program will be enhanced as described below to provide reasonable assurance that buried and underground piping and components, constructed of steel and stainless steel will perform their intended function during the period of extended operation.

NUREG-1801 Consistency

The Buried and Underground Piping aging management program is consistent with the ten elements of aging management program XI.M41, “Buried and Underground Piping and Tanks,” specified in NUREG-1801 and as modified by LR-ISG-2011-03.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Manage cracking for stainless steel piping, utilizing a method that has been demonstrated to be capable of detecting cracking, whenever coatings are removed and expose the base material. **Program Element Affected: Parameters Monitored or Inspected (Element 3)**

2. Ensure all underground carbon steel Essential Cooling Water System and Nonessential Cooling Water System piping and components within the scope of license renewal are coated in accordance with Table 1 of NACE SP0169-2007. **Program Element Affected: Preventive Actions (Element 2)**

3. Define acceptable coating conditions as coating exhibiting either no evidence of degradation, or, the type and extent of coating damage evaluated as insignificant by an individual possessing a NACE Coating Inspector Program Level 2 or 3 operator qualification, or by an individual who has attended the Electric Power Research Institute (EPRI) Comprehensive Coatings Course and completed the EPRI Buried Pipe Condition Assessment and Repair Training Computer Based Training Course. **Program Element Affected: Acceptance Criteria (Element 6)**

4. Perform inspection quantities of buried piping within the scope of license renewal in accordance with LR-ISG-2011-03, Element 4.b and Table 4a, during each 10-year period, beginning 10 years prior to the period of extended operation. The number of inspections of buried piping will be based upon the as-found results of cathodic protection system availability and effectiveness. **Program Element Affected: Detection of Aging Effects (Element 4)**

5. Perform direct visual inspections of underground Essential Cooling Water System and Nonessential Cooling Water System piping within the scope of license renewal during each 10-year period, beginning 10 years prior to the period of extended operation. **Program Element Affected: Detection of Aging Effects (Element 4)**

6. Double the inspection sample sizes within the affected piping categories if adverse indications are detected during inspection. If adverse indications are found in the expanded sample, an analysis will be conducted to determine the extent of condition and extent of cause. The size of the followup inspections will be determined based on the analysis. Timing of the additional inspections will be based on the severity of the identified degradation and the consequences of leakage. In all cases, the additional inspections will be performed within the same 10-year inspection interval in which the original adverse indication was identified. Expansion of sample size may be limited by the extent of piping subject to the observed degradation mechanism. **Program Element Affected: Detection of Aging Effects (Element 4)**

7. Use only the -850mV polarized potential criterion specified in NACE SP0169-2007 for acceptance criteria for steel piping and determination of cathodic protection system effectiveness in performing cathodic protection surveys. Alternatively, soil corrosion probes may also be used to demonstrate cathodic protection effectiveness during the annual surveys. An upper limit of -1200mV for pipe-to-soil potential measurements of coated pipes will also be established, so as to preclude potential damage to coatings. **Program Element Affected: Acceptance Criteria (Element 6)**

8. Conduct an extent of condition evaluation if observed coating damage caused by non-conforming backfill has been evaluated as significant. The extent of condition evaluation will be conducted to ensure that the as-left condition of backfill in the vicinity of the observed damage will not lead to further degradation. **Program Element Affected: Acceptance Criteria (Element 6)**

Operating Experience

The following examples of operating experience provide objective evidence that the Buried and Underground Piping program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In April 2007, LSCS began implementation of a buried pipe program. Since January 2009, between 30 and 40 periodic guided wave inspections and 10 to 12 segment excavations on piping sections of various plant systems such as fire protection, cycled condensate, reactor core isolation cooling, diesel oil transfer, and service water have been performed. Guided wave inspections provide indirect indications designed to assess accessible and inaccessible buried pipes for wall loss, and detect both internal and external corrosion. In many instances, guided wave inspections have been performed coincident with site excavations. When excavations are performed, permanent guided wave collars are typically installed to allow for readily available on-demand data. Guided wave inspection assessments and technical reports have concluded that there has been nominal pipe wall loss in the interrogated piping and in some instances sporadic regions of pipe wall loss and corrosion typical for carbon steel piping with more than 30 years of service. In addition to these guided wave inspections, 10 to 12 excavations of buried pipe segments have been performed. These excavations provided for direct visual observation of the external coatings and surfaces of piping and allowed for the assessment of conditions. In the event adverse indications are identified, the corrective action program is used to assure that appropriate corrective actions are implemented. These excavations also allow for the installation of permanent guided wave collars and cathodic protection reference cells in the immediate vicinity of the excavated piping, and in some locations electrical resistance probes, also known as soil corrosion probes are installed. The soil corrosion probes are carbon steel and stainless steel, in order to match the materials of installed buried piping and assess the corrosion rates associated with each material type.

This example provides objective evidence that a comprehensive buried piping inspection program, that performs indirect and direct inspections focusing on high risk buried piping, has been implemented. Upon discovery of adverse indications, the program appropriate corrective actions are implemented. It also demonstrates that the inspection techniques implemented in this program are capable of detecting age-related degradation prior to a loss of the component intended function.

2. Three buried pipe excavations were performed between June 2011 and November 2011. A vendor qualified to perform coating inspections per NACE standards performed inspections and completed an evaluation report on the coatings of the excavated buried pipes. The inspections for all three excavations were completed by ANSI/ASME N45.2.6 and ASTM D 4537 qualified inspectors. The scope of work for these inspections and coating assessments of the exterior of the exposed buried pipe included:

- Visual inspection of coating condition to identify and characterize apparent coating defects
- Visual inspection of exposed substrate (if any) to access corrosion conditions
- Dry Film Thickness (DFT) measurements of protection (coatings, tape, etc.)
- Assessments of coating adhesion of intact coating
- Sampling of protection/coatings for laboratory testing (if required)
- Photographic documentation of representative conditions
- Written report with digital photographs provided in both paper and electronic formats

The excavation evaluation report assessed the buried pipes for all three buried pipe excavations. Excavation #2 exposed four stainless steel reactor coolant isolation cooling system pipes within the scope of license renewal. Approximately 10 feet of each pipe was exposed in the 10’ x 10’ stepped excavation. The excavation evaluation report cited that all four pipes had a factory-applied adhesive backed aromatic bituminous 6-inch white polymer backed tape wrap, and for all four pipes the wrap was in good condition. It was tightly adhering to the substrate with good overlap with tight edges and was still pliable. The only visible damage was a tape wrap end that was loose and needed attention. There was no exposed substrate, visible damage to the pipe, corrosion, or staining present. The report concluded that, for all four pipes, the coating was intact and performing well. The as-found quality of the backfill was documented as excellent. While these pipes were excavated cathodic protection reference cells and permanent guided wave collars were installed underneath each of the four pipes, and two cathodic protection test points were installed on the Unit 2 4-inch stainless steel pipe.

This example provides objective evidence that LSCS is implementing an effective aging management program that is capable of successfully excavating, detecting, and evaluating potential degradation to buried piping and components prior to loss of intended function.

3. In 2009 during an INPO Evaluation and Assessment, LaSalle received an Area for Improvement (AFI) related to cathodic protection system. In 2012, LaSalle received a continuing AFI during a WANO Evaluation and Assessment of Buried Pipe and Cathodic Protection. Since 2009, improvements to the cathodic protection system have included upgrading cathodic protection rectifiers, installing sacrificial anodes on the Unit 1 and Unit 2 diesel generator fuel oil lines, performing two comprehensive soil samplings and soil analyses, installing multiple soil access ports to increase the accuracy of acquired data, installing several corrosion probes near safety-related pipes, installing several reference cells during buried pipe excavations to act as test points, and starting upgrades to the cathodic protection system at the Lake Screen House by installing a new impressed-current system [anodes, rectifiers, and test points].

An annual site survey for the cathodic protection system is performed by a National Association of Corrosion Engineers (NACE) qualified vendor. The scope of the annual survey includes performing a visual inspection of the cathodic protection system components, measuring and recording current-applied and interrupted structure-to-soil potentials at permanent test stations and other representative locations around the plant, measuring and recording the outputs of each rectifier/anode system, adjusting as necessary, and preparing a report to include all field data, an analysis of the data, and recommendations for proper operation and maintenance and corrective measures, if required. The cathodic protection system manager reviews these reports and trends the data.

This example provides object evidence that measures to maintain and enhance the cathodic protection system are being implemented to ensure adequate preventive measures are in place to protect buried piping.

The operating experience relative to the Buried and Underground Piping program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects, including cracking, and loss of material. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Buried and Underground Piping program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the Buried and Underground Piping program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Buried and Underground Piping program will provide reasonable assurance that the loss of material and cracking will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.29 ASME Section XI, Subsection IWE

Program Description

The ASME Section XI, Subsection IWE aging management program is an existing condition monitoring program based on ASME Code and complies with the provisions of 10 CFR 50.55a. The program consists of periodic visual and volumetric examination of pressure-retaining components of steel and concrete containments for signs of degradation, and assessment of damage. The program includes aging management of surfaces and components such as the steel and stainless steel containment liner plate surfaces and components, including its integral attachments, drywell floor liner, downcomers and bracing, penetration sleeves and closures, vacuum breaker piping and valves, pressure-retaining bolting for containment closure, personnel airlock and equipment hatches, drywell head, and other pressure-retaining components for loss of material, loss of preload, loss of leaktightness, and fretting or lockup in air-indoor uncontrolled and treated water environments.

The current program complies with ASME Section XI, Subsection IWE, 2001 Edition through the 2003 Addenda, supplemented with the applicable requirements of 10 CFR 50.55a. In accordance with 10 CFR 50.55a(g)(4), the ISI program is updated each successive 120-month inspection interval to comply with the requirements of the latest edition of the ASME Code specified 12 months before the start of the inspection interval. The ASME Code edition consistent with the provisions of 10 CFR 50.55a will be used during the period of extended operation.

LSCS primary containments are BWR Mark II concrete containments. High strength containment closure bolting susceptible to cracking is not used; therefore, surface examination to detect cracking is not applicable. Environments include air-indoor uncontrolled and treated water. The scope of the ASME Section XI, Subsection IWE program is consistent with the scope identified in Subsection IWE-1000 and includes the Class MC pressure-retaining components and their integral attachments including wetted surfaces of submerged areas of the pressure suppression chamber and vent system, containment pressure-retaining bolting, and metal containment surface areas, including welds and base metal. Containment seals and gaskets are included in the scope of the 10 CFR Part 50, Appendix J (B.2.1.32) program. Service Level 1 coatings are included in the scope of the Protective Coating Monitoring and Maintenance Program (B.2.1.36).

The program utilizes inspections that detect degradation before loss of intended function. The ASME Code Section XI, Subsection IWE program relies on design change procedures that will be enhanced to include guidance to ensure proper specification of bolting material, lubricant or sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting. The program implements the requirements of IWE by providing visual examinations (General Visual and VT-3) and augmented inspections (VT-1) for evidence of aging effects that could affect structural integrity or leak tightness of the primary containment. Areas subject to augmented inspection are subject to visual inspection (VT-1) and volumetric (ultrasonic) examination techniques as required by engineering. The program addresses the E-A and E-C examination categories described in Table IWE-2500-1 and as approved per 10 CFR 50.55a. The program specifies examinations of accessible surfaces to detect aging effects as addressed in IWE-3500. The frequency and scope of examinations specified is in accordance with 10 CFR 50.55a, and ASME Section XI, Subsection IWE-2400.

The ASME Section XI, Subsection IWE program complies with ASME Section, XI Subsection IWE for inspection of Class MC and metallic shell and penetration liners of Class CC pressure-retaining components and their integral attachments, in accordance with the provisions of 10 CFR 50.55a. The monitoring methods have been demonstrated effective in detecting the applicable aging effects and the frequency of monitoring is adequate to prevent significant aging. The concrete portions of the primary containments are inspected in accordance with ASME Section XI, Subsection IWL program.

The ASME Section XI, Subsection IWE program provides for periodic inspections for the presence of age-related degradation on all accessible surfaces of the containment on a scheduled basis. When examination results require an evaluation or the component is repaired and is found to be acceptable for continued service, the areas containing such flaws, degradation, or repair are reexamined during the next inspection period, in accordance with Examination Category E-C.

The acceptance criteria for the ASME Section XI, Subsection IWE program are in accordance with the requirements of the ASME Code, Subsections IWE-3000 and IWE-3500.

Category E-A examinations are conducted by a certified VT-3 examiner or engineer; and Category E-C examinations are conducted by a certified VT-1 examiner or engineer. Indications are evaluated and compared to acceptance standards. The IWE Responsible Individual is responsible for evaluation of examination results. Unacceptable conditions are recorded and documented in accordance with the corrective action program and supplemental examinations are performed in accordance with IWE-3200. Conditions which do not meet the acceptance criteria are accepted by an engineering evaluation or corrected by repair or replacement in accordance with IWE-3122.

Repairs and reexaminations, when required, are performed in accordance with IWA-4000 as required by IWE-3124 and the components are repaired or replaced to the extent necessary to meet the acceptance standards of IWE-3500. Component reexaminations are conducted in accordance with the requirements of IWA-2200 and the results are recorded to demonstrate that the repair meets the owner defined acceptance standards per IWE-3500.

The program will be enhanced, as noted below, to provide reasonable assurance that the ASME Section XI, Subsection IWE program aging effects will be adequately managed during the period of extended operation.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWE aging management program will be consistent with the ten elements of aging management program XI.S1, "ASME Section XI, Subsection IWE," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting. **Program Element Affected: Preventive Actions (Element 2)**

2. If leakage from the reactor cavity pool drain line welds exists, then perform ultrasonic thickness measurements on the Unit 2 drywell liner at 0 and 180 degrees for several feet below elevation 813. The inspections will begin in 2015 and a periodic inspection frequency will be established based on the inspection results. **Program Element Affected: Monitoring and Trending (Element 5)**

Operating Experience

The following examples of operating experience provide objective evidence that the ASME Section XI, Subsection IWE program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 2006, during ASME Section XI, Subsection IWE program examinations, two indications of corrosion with loss of metal thickness were identified on the 0.5-inch nominal thickness portion of the Unit 1 drywell liner at 743 foot elevation and about 85 degree azimuth. One indication measured 11/16 inches long by 3/16 inches wide by 0.081 inches deep and the other measured 7/16 inches long by 3/16 inches wide by 0.045 inches deep. This condition was entered into the corrective action program, an engineering evaluation was performed, and augmented inspections including ultrasonic thickness measurements were scheduled for the next outage. The evaluation accepted the condition and determined that these indications did not affect the ability of the liner to perform its function. The evaluation also stated that that the indications were likely present from initial construction as there had been no mechanism for erosion or corrosion that would cause or continue to degrade the liner at that location. Uncoated areas at this elevation were also recoated following the examinations.

An augmented examination using VT-1 visual examination methods, pit depth gauge and ultrasonic thickness measurements was performed in 2008; and no changes to the length, width, and depth resulted from the examination. Subsequent examinations have found the indications remained unchanged.

This example demonstrates that ASME Section XI, Subsection IWE program examinations are effective in identifying loss of material and that those conditions are evaluated, augmented examinations are conducted as required, and corrective actions are implemented prior to a loss of intended function.

2. In 2007, during ASME Section XI, Subsection IWE program examinations, recordable indications were identified on the Unit 2 drywell head bolting. A linear indication on drywell head closure nut number 60 was determined not acceptable, entered into the corrective action program, and was replaced in 2007 under the ASME Section XI Repair/Replacement plan. The other bolting indications were determined to be acceptable.

This example demonstrates that ASME Section XI, Subsection IWE program examinations are effective in identifying degraded pressure-retaining bolting conditions and that corrective actions are implemented to prior to a loss of intended function.

3. In 2008, during underwater ASME Section XI, Subsection IWE program examinations, recordable indications were identified on Unit 1 suppression pool stainless steel downcomer surfaces. The indications, consisting of arc strikes, weld splatter, gouges, attachments, and scratches on the stainless steel surfaces of a number of downcomers were entered into the corrective action program. The corrective action report stated that the indications noted appeared to be from the construction period.

An engineering evaluation was performed and determined that the indications and attachments noted are acceptable, did not impact the structural integrity of the downcomers, and the downcomers remain fully qualified and capable of performing their design function.

This example demonstrates that ASME Section XI, Subsection IWE program examinations are effective in identifying loss of material and other indications, and that those indications are evaluated before there is a loss of intended function.

4. In 2010, during ASME Section XI, Subsection IWE program examinations, a number of uncoated areas on the Unit 1 drywell liner with acceptable light surface corrosion were noted. Although the liner condition was acceptable, the uncoated area condition was entered into the corrective action program, a work order was generated, and a protective coating was applied to these liner areas in 2012.

This example demonstrates that ASME Section XI, Subsection IWE program examinations are effective in identifying uncoated areas with light surface corrosion, and that corrective actions are implemented to prior to a loss of intended function.

5. In 1998, after the reactor cavity had been filled with water for an extended period, water was observed seeping through the concrete below where the reactor cavity pool drain line connects to the reactor cavity pool liner. A corrective action program issue report was initiated. Engineering determined that the leakage resulted from defective welds where the drain lines connect to the reactor cavity pool liner. Although degradation of the primary containment liner was unlikely, UT inspections were performed in 1999 of the upper primary containment liner areas near the drain line connection welds and confirmed that the liner was not adversely affected. Seal plugs were designed and installed in the drain line weld area during outages, but did not effectively seal the area. Additional UT measurements were performed in 2005 of the Unit 2 primary containment liner in these areas; and liner thicknesses measured were greater than the nominal liner thickness specified. In 2010, an ISI inspection noted that continued leakage could be possible during refueling outages. UTs are scheduled to be performed in 2015. In addition, the IWE program is enhanced such that, if leakage from the reactor cavity pool drain line welds exists, then ultrasonic thickness measurements on the Unit 2 drywell liner will be periodically performed.

This example demonstrates that ASME Section XI, Subsection IWE program examinations are effective in identifying conditions which may possibly affect IWE components, and that when such conditions are identified examinations are conducted to determine whether loss of material has occurred in order to preclude a loss of intended function.

The above examples provide objective evidence that the existing ASME Section XI, Subsection IWE program is capable of detecting the aging effects associated with this program. The primary containment liner plate, including its integral attachments, penetration sleeves, pressure-retaining bolting, personnel airlock and equipment hatches, diaphragm slab liner, downcomers, and other pressure-retaining components have been found to be in acceptable condition during inspections performed in accordance with ASME Section XI, Subsection IWE. The corrosion identified would not cause significant impact to the safe operation of the plant. The operating experience relative to the ASME Section XI, Subsection IWE program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including fretting or lockup, loss of leaktightness, loss of material and loss of preload. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the ASME Section XI, Subsection IWE program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the ASME Section XI, Subsection IWE program, will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced ASME Section XI, Subsection IWE program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.30 ASME Section XI, Subsection IWL

Program Description

The ASME Section XI, Subsection IWL aging management program is an existing condition monitoring program which implements examination requirements of the ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWL for Class CC Concrete Components of Light-Water Cooled Plants, as mandated by 10 CFR 50.55a. The scope of the program includes reinforced concrete and the unbonded post-tensioning system and manages the identified aging effects of components within the scope of license renewal in air–indoor uncontrolled, ground water, soil, and water–flowing environments.

The current program complies with ASME Section XI, Subsection IWL, 2001 Edition through the 2003 Addenda, supplemented with the applicable requirements of 10 CFR 50.55a. In accordance with 10 CFR 50.55a(g)(4), the ISI program is updated each successive 120-month inspection interval to comply with the requirements of the latest edition of the ASME Code specified 12 months before the start of the inspection interval. The ASME Code edition consistent with the provisions of 10 CFR 50.55a will be used during the period of extended operation.

The primary inspection method is a visual examination, supplemented by testing. Inspection methods, inspected parameters, and acceptance criteria are in accordance with ASME Section XI, Subsection IWL as approved by 10 CFR 50.55a. Accessible concrete surfaces are subject to General Visual examination to detect deterioration and distress such as defined in ACI 201.1R and ACI 349.3R, including loss of material, cracking, increase in porosity and permeability, and loss of bond in the air-indoor uncontrolled environment. Concrete surfaces that exhibit deterioration and distress, based on General Visual examination, are subject to Detailed Visual examination to determine the magnitude and extent of deterioration and distress. In addition, concrete surfaces at the bearing plates for tendon anchorages are subject to Detailed Visual examination. One tendon wire of each type is also examined for loss of material and subject to physical testing to determine yield strength, ultimate tensile strength, and elongation. Tendon corrosion protection medium is analyzed for alkalinity, water content, and soluble ion concentrations. Any free water contained in the anchorage end cap and free water which drains from tendons during the examination is documented. Samples of the free water are also analyzed for pH.

Prestressing forces are measured in selected sample tendons. Evaluation of prestressing forces is addressed in the Concrete Containment Tendon Prestress (B.3.1.2) program. Acceptance criteria, corrective actions, and expansion of the inspection scope when degradation exceeding the acceptance criteria is found, are in accordance with ASME Section XI, Subsection IWL. Prestressing forces of the sample and common tendons are compared to the minimum required values and values predicted for the specific tendon at the specific time of the test, as described in Regulatory Guide 1.35.1. Conditions that do not meet acceptance criteria are entered into the corrective action program.

The augmented examination requirements following post-tensioning system repair and replacement activities are in accordance with ASME Section XI, Subsection IWL. Post-tensioning system repair and replacement activities following post-tensioning system repair and replacement activities are in accordance with ASME Section XI, Subsection IWL.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWL aging management program will be consistent with the ten elements of aging management program XI.S2, "ASME Section XI, Subsection IWL," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Explicitly require that areas of concrete deterioration and distress be recorded in accordance with the guidance provided in ACI 349.3R. **Program Element Affected: Acceptance Criteria (Element 6)**

2. Include quantitative acceptance criteria, based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R, that will be used to augment the qualitative assessment of the Responsible Engineer. **Program Element Affected: Acceptance Criteria (Element 6)**

Operating Experience

The following examples of operating experience provide objective evidence that the ASME Section XI, Subsection IWL program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 2003, while performing an inspection of a Unit 1 vertical containment tendon seven wires out of 90 were found to have failed. A corrective action program issue report was initiated. The failed wires were found while performing Inservice Inspection of the pre-stressed concrete containment post-tensioning systems examinations. Additional inspections were conducted to determine the extent of condition. Each of the tendon wire failures and tendon corrosion degradation occurred in the upper trumpet areas of the vertical "A" tendons. Of the 120 vertical tendons per Unit used to pre-stress the primary containment, six tendons were found degraded with broken wires in Unit 1, and two tendons were found degraded with broken wires in Unit 2. In addition to the broken wires, four vertical tendons in Unit 1 were also found degraded with internal corrosion. The 12 degraded tendons were subsequently replaced as corrective actions.

The root cause conducted for this event identified that the tendon wires degraded and failed due to water-induced corrosion caused by failure of the water intrusion barrier gaskets and aided by a loss of the corrosion protection medium (grease), in the top region of the “A” tendons. The upper end anchorage and grease caps for the majority of the "A" tendons are located under a cover plate on the refueling floor. Water pooling had been reported at various times and locations on the refueling floor near sources of water used for maintenance and refueling operations.

A revised floor plate and upper grease cap design with improved gaskets were installed for all accessible “A” tendons and “C” tendons to prevent recurrence. The upper end of accessible "A" tendons were also refilled with tendon grease to protect the tendons. Inaccessible tendons having welded covers are not subject to similar degradation. Subsequent inspections for both Unit 1 and Unit 2 verified the corrective actions were effective, and concluded that the containment structures post-tensioning systems experienced no abnormal degradation. The inspection results demonstrate that the containment post-tensioning systems are performing in accordance with design requirements.

This example demonstrates that the ASME Section XI, Subsection IWL ISI inspection program is effective identifying tendon degradation. It also demonstrates that when degradation is identified additional inspections are conducted to determine the extent of condition and evaluations are conducted to determine the root cause. This example also demonstrates that appropriate corrective actions including tendon replacement are performed and corrective actions to prevent recurrence are also implemented and verified effective.

2. In 2010, Unit 1 Containment ISI IWL concrete examinations were completed with satisfactory results. Conditions observed were consistent with conditions observed during baseline inspections. Staining of concrete walls due to minor grease leakage from tendon cans was subsequently cleaned. Various minor indications such as spalling, popouts and surface voids observed during initial inspection were unchanged. Horizontal and vertical cracks were observed with some radial cracking around penetrations. These cracks were determined to be acceptable normal and expected shrinkage cracks for concrete walls. No degradation had occurred since the initial inspection period. This example demonstrates that the condition of the primary containment reinforced concrete which is sheltered within the reactor building is not degrading and that no significant changes have occurred from previous inspections. Conditions such as cracking and loss of material are detected and are evaluated and corrected as necessary before they have an impact on containment concrete structural integrity.

3. In 2011, Unit 2 Containment ISI IWL concrete examinations were completed with satisfactory results. Conditions observed were consistent with conditions observed during baseline inspections. Staining of concrete walls due to some minor grease leakage from tendon cans was observed and subsequently cleaned. Horizontal and vertical cracks were observed with some radial cracking around penetrations. These cracks were determined to be acceptable normal and expected shrinkage cracks for concrete walls. A previously noted horizontal crack width measurement was different than previously recorded and a minor vertical crack which was not previously recorded were noted and determined acceptable. Although acceptable with no active leaching or leakage at the time of inspection, a previously noted limited area of minor cracking, efflorescence, and staining was identified in the corrective action program. This example demonstrates that the condition of the primary containment reinforced concrete which is sheltered within the reactor building is acceptable and that no significant changes have occurred from previous inspections. Conditions such as cracking, loss of material, leakage, and staining are detected and evaluated before they have an impact on containment concrete structural integrity.

4. In 2014, Unit 1 Containment ISI IWL inspections of the drywell floor were completed with satisfactory results. No concrete floor cracks were observed and no separation or gap was found at the floor concrete to liner junction. The inspector noted that no possible leakage path from the floor surface to the liner was observed. This example demonstrates that the condition of the primary containment drywell floor concrete is not degrading and that no drywell floor cracks or separation gap exists that could provide a path for water to the inaccessible portion of the liner.

The operating experience relative to the ASME Section XI, Subsection IWL program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking, cracking and distortion, cracking, loss of bond, and loss of material (spalling, scaling), increase in porosity and permeability, loss of strength, loss of material, loss of preload, and loss of sealing. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the ASME Section XI, Subsection IWL program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the ASME Section XI, Subsection IWL program, will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced ASME Section XI, Subsection IWL program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.31 ASME Section XI, Subsection IWF

Program Description

The ASME Section XI, Subsection IWF aging management program is an existing condition monitoring program that consists of periodic visual examination of ASME Section XI Class 1, 2, 3, and MC piping and component support members for loss of material, loss of mechanical function, and loss of preload in air–indoor uncontrolled and treated water environments. Bolting for supports is also included with these components and inspected for loss of material and loss of preload by inspecting for missing, detached, or loosened bolts and nuts. The program utilizes procedures that are consistent with industry guidance to ensure proper specification of bolting material, lubricant, and installation torque to prevent or minimize loss of bolting preload or other loss of structural integrity. Indications of degradation are entered in the corrective action program for evaluation or correction to ensure the intended function of the component support is maintained.

The current program complies with ASME Section XI, Subsection IWF, 2001 Edition through the 2003 Addenda as approved in 10 CFR 50.55a. In accordance with 10 CFR 50.55a(g)(4), the ISI program is updated each successive 120-month inspection interval to comply with the requirements of the latest edition of the ASME Code specified 12 months before the start of the inspection interval. The ASME Code edition consistent with the provisions of 10 CFR 50.55a will be used during the period of extended operation. The monitoring methods are effective in detecting the applicable aging effects and the frequency of monitoring is adequate to prevent significant degradation.

The ASME Section XI, Subsection IWF program utilizes inspections that detect degradation before loss of intended function. Preventive measures associated with structural bolts are addressed in implementing procedures.

The program will be enhanced, as noted below to provide reasonable assurance that the ASME Section XI, Subsection IWF program aging effects will be adequately managed during the period of extended operation.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWF aging management program will be consistent with the ten elements of aging management program XI.S3, "ASME Section XI, Subsection IWF," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Provide guidance for proper specification of bolting material, storage, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting. Requirements for high strength bolts shall include the preventive actions for storage, lubricants, and stress corrosion cracking potential discussed in Section 2 of RCSC (Research Council on Structural Connections) publication “Specification for Structural Joints Using ASTM A325 or A490 Bolts.” Lubricants that contain molybdenum disulfide (MoS_2) shall not be applied to high strength bolts within the scope of license renewal. **Program Element Affected: Preventive Actions (Element 2)**

2. Provide guidance, regarding the selection of supports to be inspected on subsequent inspections, when a support is repaired in accordance with the corrective action program. The enhanced guidance will ensure that the supports inspected on subsequent inspections are representative of the general population. **Program Element Affected: Monitoring and Trending (Element 5)**

Operating Experience

The following examples of operating experience provide objective evidence that the ASME Section XI, Subsection IWF program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 2013, during ASME Section XI, Subsection IWF inservice inspection of a Unit 2, ASME Class 1 rigid seismic restraint, a loose pipe clamp bolt was identified. A corrective action program issue report was initiated. The loose bolting was corrected and required scope expansion examinations were performed on three additional supports in accordance with ASME Section XI, IWF-2430. During the ISI sample expansion examinations a loose bolt was found on another pipe support. The loose bolting was corrected, and the examination scope was again expanded to include 11 additional supports in accordance with ASME Section XI, IWF-2430. During the ISI sample expansion examinations another loose bolt was found on another pipe support. The loose bolting was corrected, and the examination scope was expanded in accordance with ASME Section XI, IWF-2430 (c) to the remaining supports on that pipe line which are potentially subject to the same condition. The loose bolting identified would not have prevented the supports from performing their intended function. However, the scope of examinations was expanded to determine the extent of condition and the loose bolting conditions identified were corrected. This example demonstrates that conditions such as loose bolting are identified and corrected, and that additional supports are examined as required for similar conditions.

2. In 2012, during ASME Section XI, Subsection IWF inservice inspection of a Unit 1 ASME Class 1 feedwater pipe restraint, a loose pipe clamp bolt was identified. A corrective action program issue report was initiated. The loose

bolting was corrected and the required scope expansion examinations were performed in accordance with ASME Section XI, IWF-2430. Additional recordable indications were identified and additional sample expansions were conducted such that every Class 1 support on the A and B feedwater lines were examined. This example demonstrates that conditions such as loose bolting are identified and corrected, and that additional supports are examined as required for similar conditions.

The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of material, loss of mechanical function and loss of preload. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Problems identified such as loose fasteners or loose lock nuts would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to address these conditions. Periodic self-assessments of the ASME Section XI, Subsection IWF program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the ASME Section XI, Subsection IWF program, will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced ASME Section XI, Subsection IWF program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.32 10 CFR Part 50, Appendix J

Program Description

The 10 CFR Part 50, Appendix J aging management program is an existing condition monitoring program that manages detection of aging effects including loss of material, loss of leak tightness, and loss of bolting preload in the containment and various systems penetrating primary containment. The program also detects loss of sealing due to degradation of gaskets and seals. The program manages steel containment structural elements, concrete embedments, penetration sleeves, hatches, airlocks, and bolting in air-indoor uncontrolled and treated water environments.

The program consists of tests performed in accordance with the regulations and guidance provided in 10 CFR 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," Option B, Regulatory Guide 1.163, "Performance-Based Containment Leak-Testing Program," NEI 94-01, "Industry Guideline for Implementing Performance-Based Options of 10 CFR Part 50, Appendix J," and ANSI/ANS 56.8, "Containment System Leakage Testing Requirements."

Containment leak rate tests are performed to assure that leakage through the containment and systems and components penetrating primary containment does not exceed allowable leakage limits specified in the Technical Specifications. An integrated leak rate test (ILRT) is performed during a period of reactor shutdown at the frequency specified in 10 CFR Part 50, Appendix J, Option B. Local leak rate tests (LLRT) are performed on isolation valves and containment access penetrations at frequencies that comply with the requirements of 10 CFR 50, Appendix J, Option B.

NUREG-1801 Consistency

The 10 CFR Part 50, Appendix J aging management program is consistent with the ten elements of aging management program XI.S4, "10 CFR Part 50, Appendix J," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the 10 CFR Part 50, Appendix J program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. The adjusted as-left leakage rate for Unit 1 was 0.47044 percent/day,

following the 2008 ILRT, and was 0.3863 percent/day for Unit 2 following the 2009 ILRT. Both these results are well below the maximum limit of 0.75 La (where La is the maximum allowable primary containment leakage rate) allowed by the technical specifications for as-left containment leakage rate technical specification limits. These results show that equipment is being adequately maintained and that equipment maintenance has been capable of creating a significant safety margin between the technical specifications allowable limits and the as-tested values. The test results show the effects of aging are effectively being managed for the primary containment boundary.

This example provides objective evidence that the 10 CFR Part 50, Appendix J program effectively manages leakage through the primary containment and systems and components penetrating primary containment to ensure that the leakage rate does not exceed allowable leakage rate values as specified in the technical specifications or associated bases.

2. A Focused Area Self-Assessment (FASA) for the Appendix J program was conducted in November 2011. The purpose of the FASA was to assess program implementation, its supporting applications including the use of the corrective action program, and program effectiveness. The conclusion was that the implementation of the program was satisfactory with no deficiencies identified. Eight performance improvement recommendations and one strength were identified. Activities were assigned to track implementation of the improvement recommendations.

This example provides objective evidence that the 10 CFR Part 50, Appendix J program owner critically self-assesses program performance and self-identifies actions that support continuous improvement.

3. In 2011 during the Unit 2 refueling outage, a combustible gas control isolation valve failed to meet its LLRT acceptance criteria and was scheduled for repair. Following repair the LLRT was re-performed with successful results prior to exiting the Unit 2 refueling outage. A corrective action program issue report was generated to document the as-found failure.

This example provides objective evidence that components exceeding the allowable leakrate acceptance criteria are being entered into the correction action program, evaluated, repaired, and subsequently retested in accordance with the 10 CFR Part 50, Appendix J program.

4. A corrective action program issue report was generated in July 2011 to document the results of a LOCA-Drywell Temperature sensitivity study performed by General Electric-Hitachi (GEH) in support of the LSCS Extended Power Uprate (EPU). The sensitivity study indicated that the peak accident pressure (Pa) may be higher when using an initial lower drywell temperature versus the maximum allowable drywell temperature. Using the lower temperature increases the result by three percent. This new Pa was identified to impact the primary containment leakage rate testing program. As a result, LLRT and ILRT test procedures were revised.

This example provides objective evidence that design changes that impact the primary containment leakage rate testing program are capture in the corrective action program.

The operating experience relative to the 10 CFR Part 50, Appendix J program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of leaktightness, loss of material, loss of preload and loss of sealing. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the 10 CFR Part 50, Appendix J program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the 10 CFR Part 50, Appendix J program, will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing 10 CFR Part 50, Appendix J program provides reasonable assurance that the identified aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.33 Masonry Walls

Program Description

The Masonry Walls aging management program is an existing condition monitoring program implemented as part of the current structures monitoring program. It is based on the guidance provided in IE Bulletin 80-11, “Masonry Wall Design," and NRC Information Notice 87-67, “Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11," and is implemented through station procedures.

The Masonry Walls program manages inspections of masonry walls for loss of material and cracking, and will be enhanced to include inspection for separation and for gaps between the supports and masonry walls that could impact the intended function of the walls. Environments include air-indoor uncontrolled and air-outdoor. The program relies on periodic visual inspections to monitor and maintain the condition of masonry walls within the scope of license renewal so that the established design basis for each masonry wall remains valid during the period of extended operation. Masonry walls that are considered fire barriers are also managed by the Fire Protection (B.2.1.16) program.

The masonry walls are currently monitored under the existing structures monitoring program to ensure that a loss of an intended function does not occur. Conditions found to be “acceptable with deficiencies” or deemed to be “unacceptable” are documented and entered into the corrective action program for evaluation which will result in analysis, repair or replacement, as necessary.

NUREG-1801 Consistency

The Masonry Walls aging management program will be consistent with the ten elements of aging management program XI.S5, "Masonry Walls," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Provide guidance for inspection of masonry walls for separation and gaps between the supports for masonry walls .**Program Elements Affected: Parameters Monitored/Inspected (Element 3), Acceptance Criteria (Element 6)**

2. Require that personnel performing inspections and evaluations meet the qualifications described in ACI 349.3R. **Program Element Affected: Detection of Aging Effects (Element 4)**

Operating Experience

The following examples of operating experience provide objective evidence that the Masonry Walls program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 2004, following a recorded seismic event, a walkdown of plant structures including masonry walls, the lake screen house, dike, and makeup and blowdown lines was performed. The walkdown identified minor cracking and loose mortar on removable block walls in the turbine building. The walkdown results were documented within the corrective action program and evaluated, reviewed, and approved within an engineering evaluation. The mortar joints were repaired and minor cracking along the joints of the removable masonry block walls was found to be acceptable. This example demonstrates that inspections of masonry walls by plant personnel, similar to those periodically performed under the current structures monitoring program, are effective at identifying degraded conditions prior to loss of intended function. The corrective action program is effectively used to identify, evaluate, and correct degraded conditions.

2. In 2011, during a walkdown of fire barriers by engineering personnel, a small localized area of missing mortar was identified on a joint between two concrete blocks located on the east masonry wall of the auxiliary equipment room. The condition was documented in the corrective action program. Engineering personnel evaluated the condition and determined that it did not affect either the design function of the masonry wall or the ability of the wall to maintain its function as a fire barrier; therefore repair was not required. This example demonstrates that inspections of masonry walls, similar to those periodically performed under the current structures monitoring program, are effective in identifying minor degradation and when conditions are identified which could potentially affect either function, and that they are entered and evaluated within the corrective action program.

3. In 2005, a routine technical assessment was performed on the Structures Monitoring (B.2.1.34) program by corporate engineering personnel at LaSalle County Station. Inspections of masonry walls are performed within the Structures Monitoring program. This assessment determined that the Structures Monitoring program requirements were adequately met; routine structural walkdowns were being completed; notebooks for documenting inspection results were maintained; the frequency of evaluations were performed as required per corporate procedures; and the corrective action program was being used to document identified deficiencies. A recommendation was made to use periodically issued work orders (predefines) to assist in scheduling and tracking the completion of inspections. This recommendation was implemented. This example demonstrates that the corporate assessment of the current structures monitoring program that is used to implement periodic inspections of masonry walls was effective in verifying that critical elements of the program were being performed.

The operating experience relative to the Masonry Walls program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including cracking. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic technical assessments of the Masonry Walls program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Masonry Walls program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Masonry Walls program will provide reasonable assurance that the cracking aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.34 Structures Monitoring

Program Description

The Structures Monitoring aging management program is an existing condition monitoring program that was developed to implement the requirements of 10 CFR 50.65 and is based on NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." The program includes elements of the Masonry Walls (B.2.1.33) program and RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program. As a result, the program elements incorporate the requirements of NRC IEB 80-11, "Masonry Wall Design," and the guidance in NRC IN 87-67, "Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11." The structures and structural components are inspected by qualified personnel in accordance with station procedures which will be enhanced to be consistent with ACI 349.3R. Concrete structures are inspected for indications of deterioration and distress including evidence of leaching, loss of material, cracking, and a loss of bond, as defined in ACI 201.1R, "Guide for Making a Condition Survey of Existing Buildings." Steel components are inspected for loss of material due to corrosion. Masonry walls are inspected for cracking and loss of material. Environments include air-outdoor, air-indoor uncontrolled, treated water, raw water, water-flowing, and ground water and soil.

The program also includes provisions for periodic testing and assessment of ground water chemistry and inspection of accessible below grade concrete structures. A de-watering system is not relied upon to control settlement and porous concrete was not used in the design of foundations.

Inspection frequency for the in scope structures does not exceed five years, with provisions for more frequent inspections when conditions are observed that have a potential for impacting an intended function. Unacceptable conditions, when found, are evaluated or corrected in accordance with the corrective action program.

Protective coatings are not relied upon to manage the effects of aging for structures included in the scope of this program.

NUREG-1801 Consistency

The Structures Monitoring aging management program will be consistent with the ten elements of aging management program XI.S6, "Structures Monitoring," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Add the following components and commodities:

    a. Pipe, electrical, and equipment component support members

    b. Pipe whip restraints and jet impingement shields

    c. Panels, racks, cabinets, and other enclosures

    d. Sliding surfaces

    e. Sumps

    f. Electrical cable trays and conduits

    g. Electrical duct banks

    h. Tube tracks

    i. Transmission tower (including takeoff towers) and foundation (including cycled condensate storage tank foundations)

    j. Penetration seals and sleeves

    k. Blowout panels

    l. Permanent drywell shielding

    m. Transformer foundation

    n. Bearing pads

    o. Compressible joints

    p. Hatches, plugs, handholes, and manholes

    q. Metal components (decking, vent stack, and miscellaneous steel)

    r. Building features – doors and seals, bird screens, louvers, windows, and siding

    s. Concrete curbs and anchors

Program Element Affected: Scope of Program (Element 1)

2. Provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting. **Program Element Affected: Preventive Actions (Element 2)**

3. Revise storage requirements for high strength bolts to include recommendations of Research Council on Structural Connections (RCSC) Specification for Structural Joints Using High Strength Bolts, Section 2.0. **Program Element Affected: Preventive Actions (Element 2)**

4. Require acceptance and evaluation of structural concrete using quantitative criteria based on Chapter 5 of ACI 349.3R. **Program Element Affected: Acceptance Criteria (Element 6)**

5. Monitor raw water and ground water chemistry on a frequency not to exceed five years for pH, chlorides, and sulfates and verify that it remains non-aggressive, or evaluate results exceeding criteria to assess impact, if any, on below-grade concrete. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)**

6. Monitor concrete for increase in porosity and permeability, inspection of accessible sliding surfaces for indication of significant loss of material due to wear or corrosion, debris, or dirt. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)**

7. For in scope structures, examine representative samples of the exposed portions of the below grade concrete when excavated for any reason. **Program Element Affected: Detection of Aging Effects (Element 4)**

8. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R with respect to knowledge of inservice inspection of concrete and visual acuity requirements. **Program Element Affected: Acceptance Criteria (Element 6)**

9. Clarify that loose bolts and nuts and cracked high strength bolts are not acceptable unless accepted by engineering evaluations. **Program Element Affected: Acceptance Criteria (Element 6)**

Operating Experience

The following examples of operating experience provide objective evidence that the Structures Monitoring program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 2010, inspections of the reactor building structural steel were performed prior to the start of modification activities for a reactor building crane upgrade. The inspection identified structural steel connections that were not in accordance with design requirements. At one connection a clip angle was pulled away from a column web and another connection contained three loose bolts. Both conditions were entered into the corrective action program for evaluation. The evaluation determined that the conditions did not prevent the structure from performing its intended function. The gap between the clip and beam on the column was reworked to eliminate the gap. The bolted connection was tightened in accordance with design requirements. This example demonstrates that when conditions are found, such as loose bolts,

they were evaluated to determine operational impacts, and corrected as required using the corrective action program. The enhanced Structures Monitoring program will require continued inspection for signs of degradation for structural connections.

2. In 2010, during routine walkdowns as part of the Structures Monitoring program, a fire door was found with a loose bottom seal. This condition was entered into the corrective action program for evaluation. The door was determined to operable. A work order was created to immediately correct the condition by retightening the loose door seal. This example demonstrates that walkdowns identify degraded conditions that could impair structural components and they are promptly corrected. The Structures Monitoring program will continue to inspect doors to ensure that they meet their intended design functions.

3. In 1989, following modification and installation of high-density fuel storage racks in the Unit 2 fuel pool, one leak was identified through the east side of the Unit 2 spent fuel pool (SFP). This leakage was estimated to be less than 0.25 gpm. This value was determined by monitoring leakage in a drain line sight glass during a complete fuel off-load and re-load. The drain line also has an inline flow meter installed to alarm on excessive leakage. A technical evaluation was performed on this condition and determined that the leakage did not challenge the makeup capability to the SFP. If leakage increased, it would be evident via the flow alarm in the main control room. There were no alarms received within the control room from this switch since the initial discovery. The site glass is visually monitored quarterly and there was no reported increase in leakage. In 2014, during fuel movement within the Unit 2 fuel pool, the system manager reported only observing water droplets present within the sight glass and no signs of an active leak. A corrective action program issue report was initiated. Water samples confirmed the source of the leakage to be SFP water. The stainless steel lined concrete SFP walls are interior reactor building walls surrounded by rooms within the reactor building. The leakage from the unit 2 SFP was measured and leakage was determined to be less than one ounce per hour from the fuel pool. The exterior of the SFP walls show no evidence of external leakage, thus indicating that the leakage is contained within the leak chase channels and that there is no effect on the structural integrity of the SFP. This example provides objective evidence that when conditions are found that could potentially impact the intended function of structures, they are entered into the corrective action program and appropriate actions are taken.

The operating experience relative to the Structures Monitoring program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects prior to a loss of intended function. Appropriate guidance for evaluation, repair, or replacement is provided for components where degradation is found. Periodic self-assessments of the Structures Monitoring program are also performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Structures Monitoring program with enhancements, will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Structures Monitoring program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.35 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants

Program Description

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants aging management program is an existing condition monitoring program implemented as part of the current structures monitoring program. The program consists of inspection and surveillance programs for slopes, canals, intake structures, intake flume, and other water-control structures associated with emergency cooling water systems and flood protection based on RG 1.127, Revision 1, “Inspections of Water-Control Structures Associated with Nuclear Power Plants.” The RG 1.127, Inspections of Water-Control Structures Associated with Nuclear Power Plants program includes the Lake Screen House, intake flume retaining walls, submerged Core Standby Cooling System Pond embankment and intake flume channel and embankment, shad net anchors, and the Core Standby Cooling System outfall structure.

Structural components and commodities monitored include reinforced concrete members, steel components (hatches/plugs), bolting and structural steel, trash bar racks, sheet piling, shad net components, earthen sides of the intake flume canal, silt and debris accumulation, and degradation due to extreme environmental conditions.

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants addresses age-related degradation, degradation due to extreme environmental conditions, and the effects of natural phenomena that may affect the safety function of the water-control structures. The program manages loss of material, cracking, loss of bond, loss of material (spalling, scaling), increase in porosity and permeability, and loss of form. Environments include air-indoor uncontrolled; air-outdoor, raw water, water-standing, water-flowing, groundwater and soil. Elements of the program are designed to detect degradation and take corrective action to prevent a loss of intended function.

LaSalle was not required to comply with NRC RG 1.127, Revision 1 for the Lake Screen House and the safety-related portions of the Cooling Lake. However, the Lake Screen House and the safety-related portions of the Cooling Lake will be monitored by the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program consistent with the guidance provided in RG 1.127, Revision 1 and American Concrete Institute (ACI) 349.3R.

NUREG-1801 Consistency

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants aging management program will be consistent with the ten elements of aging management program XI.S7, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants,” specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Include monitoring of the following:

    a. Submerged Core Standby Cooling System Pond and Intake Flume (includes earthen walls, south flume concrete retaining wall, and north flume sheet piling retaining wall)

    b. Core Standby Cooling System outfall structure

    c. Bar racks and miscellaneous steel

    d. Shad net anchors

    e. Lake Screen House (includes service water tunnel)

Program Element Affected: Scope of Program (Element 1)

2. Monitor raw water and ground water chemistry at least once every five years for pH, chlorides, and sulfates and verify that it remains non-aggressive, or evaluate results exceeding criteria to assess impact, if any, on buried or submerged concrete. **Program Element Affected: Detection of Aging Effects (Element 4)**

3. Provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting, and preventative actions for storage of materials to prevent stress corrosion cracking. **Program Element Affected: Preventive Actions (Element 2)**

4. Require acceptance and evaluation of structural concrete using quantitative criteria based on Chapter 5 of ACI 349.3R. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), and Acceptance Criteria (Element 6)**

5. Require inspection of accessible in scope portions of the Cooling Lake and Lake Screen House immediately following the occurrence of significant natural phenomena, which includes intense local rainfalls and large floods. **Program Element Affected: Detection of Aging Effects (Element 4)**

6. Require:

    a. The evaluation of the acceptability of inaccessible areas when conditions exist in the accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas.

b. Examination of the exposed portions of the below grade concrete when excavated for any reason.

Program Element Affected: Detection of Aging Effects (Element 4)

Operating Experience

The following examples of operating experience provide objective evidence that the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. Inspections of the service water tunnel in the Lake Screen House are performed every two years. In 2009, the inspection performed by divers identified spalling concrete on the floor of the service water tunnel which exposed reinforcing steel. The condition was entered into the corrective action program for evaluation. The engineering evaluation concluded that immediate repairs were not necessary and the degradation should be monitored during subsequent inspections until permanent repairs could be completed. Subsequent inspections did not identify any further degradation of these components. This event demonstrates that the periodic inspections of the structure are effective in the identification of degrading conditions and that the corrective action program is effectively used to evaluate degraded conditions so that corrective action can be taken prior to loss of intended function.

2. An inspection was performed of the Lake Screen House lower elevation in 2009 where there was evidence of standing water. The inspection determined that there were no adverse effects from the standing water and also identified a number of degrading conditions related to supports, including corrosion on supports, missing support bolts and nuts, missing concrete anchor, and missing grout under support base plates. These conditions were entered into the corrective action program for evaluation. The evaluations determined that these conditions did not prevent the affected components from performing their intended function. The action plan to correct the identified conditions was presented to the Senior Management Review Committee in August 2010 with all actions being approved. All repairs under the work order activities except for the addition of a strip plate have been completed. Due to the number of issues identified, the periodic inspection frequency was increased to once per year from the normal five-year inspection frequency until it was confirmed that no additional accelerated aging was occurring. This example provides objective evidence that visual inspections are effective in the identification of degrading conditions and that the corrective action program is used to modify inspection requirements where appropriate to prevent loss of intended function.

3. Portions of the Lake Screen House are submerged and exposed to water from the Cooling Lake. Weekly chemical analysis of the lake water is performed to maintain chemical parameters within prescribed limits to minimize impacts to structures and piping. In 2009, the chemical analysis determined that pH levels of the lake water had dropped below the administrative water chemistry guidelines and was readjusted to restore the pH to a level greater than 8.8. This example demonstrates that water quality levels are routinely

monitored and adjusted as required to maintain the raw water quality as conditions that are non-aggressive to submerged concrete.

The operating experience relative to the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including change in material properties, cracking, cracking and distortion, loss of bond, and loss of material (spalling, scaling), increase in porosity and permeability, loss of strength, and loss of form. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.36 Protective Coating Monitoring and Maintenance Program

Program Description

The Protective Coating Monitoring and Maintenance Program is an existing mitigative and condition monitoring program which manages the effects of loss of coating integrity of Service Level I coatings inside the primary containment (as defined in Nuclear Regulatory Commission (NRC) Regulatory Guide (RG) 1.54, Revision 2) in air-indoor and treated water environments. The failure of the Service Level I coatings could adversely affect the operation of the emergency core cooling systems (ECCS) by clogging the ECCS suction strainers. Proper maintenance of the Service Level I coating ensures that coating degradation will not impact the operability of the ECCS systems. The Protective Coating Monitoring and Maintenance Program includes coating system selection, application, inspection, assessment, maintenance, and repair for any condition that adversely affects the ability of Service Level I coatings to function as intended.

Service Level I coatings will prevent or minimize the loss of material due to corrosion but these coatings are not credited for managing the effects of corrosion for the carbon steel containment liners and components. This program ensures only that the Service Level I coatings maintain adhesion so as to not affect the intended function of the ECCS suction strainers.

The program also provides controls over the amount of unqualified coating which is defined as coating inside the primary containment that has not passed the required laboratory testing, including irradiation and simulated Design Basis Accident (DBA) conditions. Unqualified coating may fail in a way to affect the intended function of the ECCS suction strainers. Therefore, the quantity of unqualified coating is controlled to ensure that the amount of unqualified coating in the primary containment is kept within acceptable design limits.

NUREG-1801 Consistency

The Protective Coating Monitoring and Maintenance Program aging management program is consistent with the ten elements of aging management program XI.S8, "Protective Coating Monitoring and Maintenance Program," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Protective Coating Monitoring and Maintenance Program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 2013, during a Unit 2 outage, the Site Coating Coordinator performed inspections of the primary containment drywell and Service Level I coating repairs were performed in various areas. The inspection covered 100 percent of the accessible Service Level I coatings. During this outage, the following areas had coating touch up repairs performed; 740' (210 degree azimuth), and 777' (290 degree azimuth). These areas where recoated with qualified Service Level I epoxy coatings. During the outage, the inspections identified a cap and blind flange in the drywell that needed to be coated. A work order was generated and these components were re-coated during this outage. The remainder of the Service Level I coatings inspected were acceptable and no other areas requiring recoating were identified.

This operating experience demonstrates that Service Level I coatings are inspected during refueling outages by qualified coating inspectors, inspection results are evaluated by the coatings coordinator, and coating maintenance is initiated to ensure continued operability of ECCS systems.

2. In 2008, during a Unit 1 outage inspection of suppression pool coated components, several uncoated areas and degraded coatings were identified on the MSRV struts and welded lugs. The degraded coating areas were entered into the corrective action program, and evaluated by the Site Coatings Coordinator. The ECCS strainers were inspected and found to be clean. The suppression pool floor was also vacuumed to remove accumulated materials. As a result of the degraded coating conditions of the struts, it was determined that 100 percent of the coatings on these 34 struts (underwater) were to be considered unqualified and entered in the undocumented, unqualified (UDC/UQF) coatings log. Sufficient margin remained below the allowed 50 percent loading limit for the ECCS strainers. The visual inspection of the struts and lugs determined that minor surface corrosion exists with no significant loss of material. The condition of the MSRV struts will be monitored as the MSRV's are examined each outage.

This example demonstrates that when conditions are identified that could impact the Service Level I coating integrity; they are identified in the corrective action program. These conditions are evaluated and dispositioned to ensure that the ECCS design functions are maintained.

3. In 2010, during a Unit 1 outage, several areas were identified as requiring coating touch up repairs. The observed conditions was evaluated and documented within the corrective action program. The components identified for recoating were various conduit supports, cable tray support, tube support, and several liner locations. This work was planned and recoating was performed during the following outage (2012) using approved materials, qualified personnel and procedures.

This example demonstrates Service Level I coatings are inspected during refueling outages and coating deficiencies are identified, and entered into the corrective action program. This example also demonstrates that results are evaluated and dispositioned by the Site Coating Coordinator and coating maintenance is initiated to ensure the continued operability of the ECCS systems.

The above examples provide objective evidence that the Protective Coating Monitoring and Maintenance Program is capable of detecting the aging effects associated with Service Level I coatings. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions are taken to prevent recurrence. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that the implementation of the enhanced Protective Coating Monitoring and Maintenance Program will effectively identify degradation prior to loss of intended function.

Conclusion

The existing Protective Coating Monitoring and Maintenance Program provides reasonable assurance that the loss of coating integrity aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.37 Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Program Description

The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new condition monitoring program that will be used to manage the effects of reduced insulation resistance of the insulation material for non-EQ cables and connections within the scope of license renewal that are subject to adverse localized environments caused by heat, radiation, or moisture.

In most areas of LSCS, the actual ambient environments (e.g., temperature, radiation, or moisture) are less severe than the plant design environment. 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. Conductor insulation materials used in electrical cables and connections may degrade more rapidly than expected in these adverse localized environments.

Accessible cables and connections located in adverse localized environments are managed by visual inspection of the insulation. These cables and connections will be visually inspected at least once every 10 years for indications of reduced insulation resistance, such as embrittlement, discoloration, cracking, melting, swelling, or surface contamination that could indicate incipient conductor insulation aging degradation from temperature, radiation, or moisture. This is an adequate inspection frequency to preclude failures of the cable and connection insulation since experience shows that aging degradation is a slow process. Additional inspections, repairs or replacements are initiated as appropriate under the corrective action program.

This new program will be implemented prior to the period of extended operation. In addition, the first inspections will be completed prior to the period of extended operation.

NUREG-1801 Consistency

The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is consistent with the ten elements of aging management program XI.E1, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 1990, heat related aging and degradation of cable insulation material in the feedwater heater bay was identified. This cable insulation aging and degradation issue was entered into the corrective action program. The cable insulation material degradation was attributable to the cables' elevated location in the feedwater heater bay space and the cables' proximity to steam piping. The cables had been exposed to chronic heat from adjacent pipes with damaged or missing thermal insulation. The cables were determined to be operable and acceptable to perform their intended function unless manipulated or bent. Corrective actions implemented include: modification to provide forced ventilation to improve heat removal, modification to insulate turbine bypass lines and other components reducing radiant heat and heat load on ventilation system, inspection to validate rate of degradation is relatively slow over time, establishing test procedures to monitor feedwater heater bay temperatures, and establishing a long term condition monitoring program. This operating experience provides objective evidence that existing maintenance practices effectively identify observable cable jacket deficiencies and subsequently implement effective corrective actions.

2. A 2004 Licensee Event Report (LER) for a pressurized water reactor describes an occurrence of heat damage to cables that were routed in conduit near the reactor coolant system hot legs. This LER and associated evaluation for applicability was entered into the OPEX and corrective action programs. Containment temperatures near hot legs are maintained low by virtue of open grating and installing area coolers along with a temperature monitoring system. The OPEX review included a summary of findings and corrective actions implemented for the feedwater heater bay cables, including a cable condition monitoring program and walkdowns to assess extent of condition. This evaluation provides objective evidence that industry operating experience is effectively utilized to assess cables and connections in potentially adverse localized environments and to implement corrective actions.

3. In September 2010, an industry operating experience review was performed for NRC Information Notice (IN) 2010-02, Construction-Related Experience with Cables, Connectors, and Junction Boxes. The IN discusses three issues. The first two issues describe inadequacies in installation and design of cables, connectors, and junction boxes. The third issue describes issues with cables subjected to adverse localized temperature environments, in excess of design temperatures. This IN was evaluated against LSCS design and construction practices and site operating experience as documented in the corrective action program. Feedwater heater bay cable ongoing condition monitoring was also reviewed. Based on the reviews completed and the processes used during original plant design and construction, it was determined the improper cable installation practices documented in IN 2010-02 are not applicable.

Additionally, based on reviews completed and corrective actions implemented in response to the feedwater heater bay OE, it was determined that additional actions to address cables subjected to adverse localized environments was not warranted. This evaluation provides objective evidence that industry operating experience is effectively utilized to assess cable and connection insulation materials in potentially adverse localized environments and to implement corrective actions.

4. In 2012, cable insulation condition walkdowns were performed in response to INPO guidance for cable condition monitoring. The purpose of the walkdowns is to identify cables that have been exposed to potentially adverse environments/conditions in the plant. Walkdowns have been performed in non-outage accessible areas. Outage accessible area walkdowns will be performed during future outages. The results of the walkdowns did not identify aging of insulation material due to adverse localized environments. Evaluations of insulation condition observations indicated that the cables are in environments within their design parameters and that the existing conditions are acceptable. The evaluations have been documented in the corrective action program. These walkdowns provide objective evidence of the on-going robustness of the current cable condition monitoring efforts to identify and assess potential aging of cable and connection insulation materials in potentially adverse localized environments.

The operating experience relative to the Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program did not identify an adverse trend in performance. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that current design, installation, and maintenance practices along with implementation of the new Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The new Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will provide reasonable assurance that the reduced insulation resistance aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.38 Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

Program Description

The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits aging management program is a new condition monitoring program that will be used to manage the effects of reduced insulation resistance of non-EQ cable and connection insulation in instrumentation circuits with sensitive, high-voltage, low-level current signals. The in scope instrumentation circuits include:

- Portions of the Neutron Monitoring System:
  - Source range monitors (SRMs)
  - Intermediate range monitors (IRMs)
  - Local power range monitors (LPRMs)
- Portions of the Process Radiation Monitoring System:
  - Main steam line radiation monitors
  - Control room ventilation intake radiation monitors
  - Standby gas treatment stack effluent monitor
  - Station vent stack wide range gas monitor
- Portions of the Area Radiation Monitoring System:
  - Off-gas area radiation monitors.

The circuits for these instruments are located in areas where the cables and connections could be exposed to adverse localized environments caused by temperature, radiation, or moisture. These adverse localized environments can result in reduced insulation resistance causing increases in leakage currents. Other instrument circuits in the Neutron Monitoring System, Process Radiation Monitoring System, and Area Radiation Monitoring System are not in scope of this aging management program either because they are managed by the Environmental Qualification (EQ) of Electric Components program; they do not perform a license renewal intended function; or they are not sensitive high voltage, low-level signal circuits.

Calibration testing will be performed for the in scope circuits when the cables are included as part of the calibration circuit. The calibration results will be reviewed to provide an indication of the existence of aging effects based on acceptance criteria for instrumentation circuit performance. Review of results obtained during normal calibration may detect severe aging degradation prior to the loss of the cable and connection intended function. A proven cable test (such as insulation resistance tests, time domain reflectometry tests, or other testing judged to be effective in determining cable system insulation condition) will be performed for the in scope circuits when the cables are not included as part of the calibration.

This new program will be implemented prior to the period of extended operation. In addition, the first review of calibration or surveillance results and cable test results will be completed prior to the period of extended operation. Cable test frequency will be based on engineering evaluation and will be performed at least once every 10 years. Calibration and assessment of results will be performed at least once every 10 years during the period of extended operation.

NUREG-1801 Consistency

The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits aging management program will be consistent with the ten elements of aging management program XI.E2, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In February 2010, a SRM insulation shield to ground resistance was identified as degraded but still above acceptable levels, indicating a potential breach of detector electrical noise isolation. Experience indicated that degradation could be due to separated cable jacket allowing shield contact to ground, washer in detector retainer contacting detector sheath, wetted connector internals or insulating sock, or soiled path, based on similar issues for under vessel detectors during heavy periods of work activity. This issue was entered into the corrective action program. A work order to repair undervessel connections was initiated for this SRM and two others. No visible damage to the detector side connectors was detected. Visible damage was observed on one SRM field side connection. New connectors were installed on two SRM detectors' side connections and on one SRM field side connector.

Post repair testing was satisfactorily completed. This operating experience, although not attributed to cable or connection insulation aging, provides objective evidence that existing maintenance practices and the corrective action program effectively identify and correct observed instrument deficiencies.

2. In October 2011, it was identified that a control room ventilation intake radiation monitor was reading high causing a trouble alarm in the main control room. The alarm was caused by a momentary spike to 700 mR/hr before returning back to normal. The alarm was reset. This condition was entered into the corrective action program. Troubleshooting included performance of calibration and a new detector was installed. Spiking ceased following installation of the new radiation detector. Cables and connectors were not the cause of the momentary spiking. This operating experience, although not attributed to cable or connection insulation aging, provides objective evidence that existing maintenance practices and the corrective action program effectively identify and correct observed instrument deficiencies.

3. In January 2010, several Local Power Range Monitor (LPRM) circuits were identified with high shield to ground resistance during routine maintenance that performs I/V plots for LPRM circuits. Technical specification operability requirements were met, and the detectors continue to be capable of performing design functions. This condition was entered into the corrective action program. A work order was initiated to repair associated connectors during the next outage. Subsequent cable testing was performed satisfactorily with acceptable resistance measurements. This operating experience, although not attributed to cable or connection insulation aging, provides objective evidence that existing maintenance practices and the corrective action program effectively identify and correct observed instrument deficiencies.

The operating experience relative to the new Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program did not identify an adverse trend in performance. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Assessments are performed when system degradation is found to identify the areas that need improvement to maintain the quality performance of the in scope cables and connections. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that the current design, installation, and maintenance practices along with implementation of the new Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The new Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program will provide reasonable assurance that the reduced insulation resistance aging effects will be adequately managed so that the intended functions of these instrumentation cables and connections are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.39 Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Program Description

The Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new condition monitoring program that will be used to manage the effects of reduced insulation resistance of non-EQ, in scope, inaccessible power cables. For this program, power is defined as greater than or equal to 400 V. These inaccessible power cables may at times be exposed to significant moisture. Power cable exposure to significant moisture may cause reduced insulation resistance that can potentially lead to failure of the cable's insulation system.

The cables within the scope of this program will be tested using one or more proven tests for detecting reduced insulation resistance of the cable's insulation system due to wetting or submergence, such as dielectric loss (dissipation factor or power factor), AC voltage withstand, partial discharge, step voltage, time domain reflectometry, insulation resistance and polarization index, line resonance analysis, or other testing that is state of the art at the time the test is performed. The cables will be tested at least once every six years. More frequent testing may occur based on test results and operating experience. The first tests will be completed prior to the period of extended operation.

Periodic actions will be taken to prevent inaccessible cables from being exposed to significant moisture. Manholes associated with the cables included in this program will be inspected for water collection with subsequent corrective actions (e.g., water removal), as necessary. Prior to the period of extended operation, the frequency of inspections for accumulated water will be established and adjusted based on plant-specific operating experience with cable wetting or submergence, including water accumulation over time and event driven occurrences such as heavy rain or flooding. The inspection includes direct observation that cables are not wetted or submerged, that cables/splices and cable support structures are intact, and dewatering/drainage systems (i.e., sump pumps) and associated alarms operate properly. Operation of dewatering devices will be verified prior to any known or predicted heavy rain or flooding event. The first inspections will be completed prior to the period of extended operation. During the period of extended operation, the inspections will occur at least annually.

NUREG-1801 Consistency

The Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program will be consistent with the ten elements of aging management program XI.E3, "Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 2007, the NRC issued Generic Letter (GL) 2007-01, requesting failure histories and associated information describing cable inspection, testing and monitoring programs to detect the degradation of inaccessible power cables, for circuits that are in scope for Maintenance Rule. The purpose of the GL was to: inform licensees that the failure of certain power cables can affect the functionality of multiple accident mitigation systems or cause plant transients, inform licensees that the absence of adequate monitoring of cable insulation could result in abrupt failures, and request information about current associated test practices. The GL was entered into the operating experience and corrective action programs. LSCS specific operating experience was documented in the Exelon corporate response to the generic letter. In reviewing plant-specific operating experience related to inaccessible power cables, no history of failures of inaccessible or underground power cables were identified. The review examined the plant corrective action program, Maintenance Rule database, and maintenance records to identify power cable failures. In addition, the cable condition monitoring program was described. The cable monitoring program takes advantage of motor testing that is typically performed from the switchgear; therefore, motor feeder cables are tested along with the motors. Testing includes resistance, polarization index, and step voltage. If the screening indicates a problem with a cable, then appropriate diagnostic cable testing is implemented. This operating experience provides objective evidence that cable issues are identified and evaluated, with subsequent effective corrective actions via the corrective action program.

2. In 2008, Significant Event Notification (SEN) 272 was issued, documenting how a degraded underground cable resulted in a phase-to-ground fault and loss of offsite power to safety-related buses, at another plant. Significant aspects of the event included: loss of an offsite power supply resulting in plant shutdown, a 20-day forced outage to replace six damaged and 24 additional power cables, and periodic testing in lieu of cable replacements was not effective in predicting cable degradation or preventing cable failure. The SEN was entered into the operating experience and corrective action programs. The specific evaluation performed addressed several factors for cable condition monitoring. As a result of this evaluation, the inaccessible medium voltage cables were identified and documented with the cable functions and the associated potential consequence of failure. The evaluation determined that the identified inaccessible medium voltage cables were nonsafety-related, with no history of failure. It was determined that based on the functions supported by the inaccessible cables that no additional actions were currently warranted.

This evaluation of medium voltage, generation significant, and safety-related circuits provides objective evidence that inaccessible power cable industry operating experience is assessed and incorporated into maintenance and testing practices.

3. In 2010, an Exelon fleet-wide operating experience item was issued for the cable condition monitoring program. Corporate wide actions, tracked in the corrective action program were assigned to identify cables subject to wetted environments and assess and subsequently improve associated manhole configurations. Corrective actions included:

- identifying inaccessible, underground cables
- identifying which of these cables are in scope for maintenance rule and license renewal
- identifying current inspection or de-watering strategy for underground structures and manholes
- developing a schedule for inspection and if needed dewatering of underground structures and manholes
- ranking of cables in underground structures and manholes with respect to their safety or generation critical functions
- developing a long term plan for condition monitoring of safety-related or generation critical cables routed in underground structures considering testing, rerouting, or replacement.

These actions provide a cable condition monitoring program that implements cable testing and uses the test results to determine if additional testing or corrective actions may be required. These actions also provide for periodic manhole inspections and an associated improvement initiative to manholes to prevent exposing inaccessible power cables to significant moisture, i.e., installation of dewatering devices. These actions are included in the corrective action program. These corrective actions remain in place as follows:

- automatic de-watering pumps have been installed in two (2) in scope manholes with plans to install pumps in the two (2) remaining in scope manholes.
- recurring work orders are in place to inspect manholes.
- based on industry practices and LaSalle cable design, state-of-the-art cable testing methodologies have been implemented with cable testing already performed on seven (7) in scope inaccessible power cables.

This corporate wide initiative provides objective evidence that inaccessible power cables are being tested and that manholes with water accumulation are identified and evaluated with subsequent effective corrective actions included in the corrective action program.

The operating experience relative to the Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program did not identify an adverse trend in performance. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Assessments are performed when system degradation is found to identify areas that need improvement to maintain the quality performance of the in scope cables and connections. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that the implementation of the new Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The new Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will provide reasonable assurance that the reduced insulation resistance aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.40 Metal Enclosed Bus

Program Description

The Metal Enclosed Bus aging management program is an existing condition monitoring program that will be enhanced to manage the identified aging effects of in scope metal enclosed bus during the period of extended operation. The internal portions of the accessible bus enclosure assemblies are inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulation is visually inspected for signs of reduced insulation resistance, such as embrittlement, cracking, chipping, melting, discoloration, swelling, or surface contamination which may indicate overheating or aging degradation. The internal bus insulating supports are visually inspected for structural integrity and signs of cracks. External surfaces are visually inspected for loss of material due to general, pitting, and crevice corrosion. Enclosure assembly elastomers are visually inspected for surface cracking, crazing, scuffing, dimensional change, shrinkage, discoloration, hardening, and loss of strength. A sample of accessible bolted connections is inspected for increased resistance of connection by measuring the connection resistance using a micro-ohmmeter. The sample will be of 20 percent of the accessible metal enclosed bus bolted connection population with a maximum sample size of 25.

Metal enclosed buses are to be free from unacceptable visual indications of surface anomalies which suggest degradation exists. Additionally, unacceptable indications of external or internal material condition or contamination should not be present. An unacceptable indication is defined as a noted condition that, if left unmanaged, could lead to a loss of intended functions. External surfaces are to be free from general, pitting and crevice corrosion that result in loss of material. Enclosure assembly elastomers are to be free from unacceptable visual indications of degradation. The selected sample of bolted connections inspected by resistance measurements will be confirmed to be within the acceptance criteria established in program implementing procedures. Unacceptable results are subject to an evaluation under the corrective action program.

The inspections and resistance measurements are performed at least once every 10 years for indications of aging degradation. The Metal Enclosed Bus program will be enhanced prior to the period of extended operation.

NUREG-1801 Consistency

The Metal Enclosed Bus aging management program will be consistent with the ten elements of aging management program XI.E4, "Metal Enclosed Bus," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Specify internal inspections will be performed for accessible non-segregated bus duct sections that are in scope for license renewal. **Program Elements Affected: Parameters Monitored/ Inspected (Element 3), Detection of Aging Effects (Element 4)**

2. Clarify requirements for visual inspections of internal portions (bus enclosure assemblies); bus insulation; internal bus insulating supports; accessible gaskets, boots and sealants; and bus duct external surfaces. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)**

3. Specify a sample size of 20 percent of the accessible bolted connection population, with a maximum sample size of 25, will be inspected for increased resistance of connection by either thermography or measuring the connection resistance using a micro ohmmeter. **Program Elements Affected: Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)**

4. Specify an inspection frequency of at least every 10 years. **Program Elements Affected: Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)**

Operating Experience

The following examples of operating experience provide objective evidence that the Metal Enclosed Bus program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In October 2008 during the inspection of an isophase bus duct, the bus failed its megger test. During subsequent investigation it was determined that a bus insulator was damaged. During repair efforts, additional damage to adjacent insulators occurred. The issue was entered into the corrective action program. Corrective actions repaired degraded and damaged bus components. A month later an insulator failure occurred at another Exelon plant. The lessons and recommendations from these events were shared with the Exelon fleet via the Exelon OPEX Program. The recommendations were to implement hi-pot testing of isophase and non-segregated metal enclosed buses every six years. Although the isophase bus is not in scope for license renewal this issue provides objective evidence that the corrective action program and the operating experience program ensure that best practices for condition monitoring are implemented so that degraded conditions are identified and corrected prior to equipment failure.

2. In February 2010, during routine preventive maintenance, bus duct connection resistance in excess of acceptance criteria was identified for bolted connections between the 4 kV non-segregated buses and one of the unit auxiliary transformers. The issue was entered into the corrective action program. The issue was evaluated by engineering considering similar maintenance findings at another Exelon plant. Resolution for test results in excess of acceptance criteria was required for restart of the unit from a refueling outage. As part of the evaluation it was determined that the resistance measured was not performed as required by the procedure. The measurement was taken for two connections, i.e., the link, instead of for a single connection; this was determined to be a misinterpretation of instructions. These actions provide objective evidence of the rigor of implementation of current preventive maintenance practices and assessment of results so that degraded conditions are identified and corrected prior to equipment failure.

3. In November 2009, Significant Event Report SER 5-09 was issued for a 6.9 kV non-segregated bus failure at another plant. The review of this industry operating experience was entered into the corrective action program. LSCS has not experienced similar issues with their metal enclosed bus. In response to this industry operating experience, activities were initiated to incorporate the lessons learned from this event, specifically additional hi-pot testing and connection torque checks. These actions provide objective evidence that industry operating experience is being used to improve condition monitoring of the metal enclosed bus and prevent events that have occurred at other plants.

The operating experience relative to the Metal Enclosed Bus program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including increased resistance of connection, loss of material, reduced insulation resistance and surface cracking, crazing, scuffing, dimensional change, shrinkage, discoloration, hardening and loss of strength. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the Metal Enclosed Bus program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Metal Enclosed Bus program will provide reasonable assurance that the identified aging effects will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.41 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Program Description

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new condition monitoring program. The program will implement one-time testing of a representative sample of non-EQ electrical cable connections to ensure that either increased resistance of connection is not occurring or that the existing preventive maintenance program is effective such that a periodic inspection program is not required. This one-time program will provide additional confirmation to support industry operating experience that shows that electrical connections have not experienced a high degree of failures and that existing installation and maintenance practices are effective. This one-time program will also confirm that there are no aging effects requiring management during the period of extended operation. A representative sample of non-EQ electrical cable connections will be selected for one-time testing considering voltage level (medium and low voltage), circuit loading (high loading), connection type, and location (high temperature, high humidity, and vibration). The sample tested will be 20 percent of the population with a maximum sample size of 25 connections. The specific type of test performed will be a proven test for detecting increased resistance of connections, such as thermography, contact resistance measurement, or another appropriate test without removing the connection insulation, such as heat shrink tape, sleeving, insulating boots, etc.

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program does not implement visual inspections of cable connection insulation materials as an alternative to thermography.

This new aging management program will be implemented prior to the period of extended operation. The one-time tests will be completed prior to the period of extended operation.

NUREG-1801 Consistency

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program will be consistent with the ten elements of aging management program XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In August 2013, during routine thermography inspection, a hotspot was identified on a single phase, line side of the breaker for one of the station heating system chillers. Hot spots in these panels had occurred previously and were attributed to these panels being located outdoors. The issue was entered into the corrective action program. The repair plan included disassembly of the connection and cleaning of the components. Although the station heating chiller is not in scope for license renewal, this issue provides objective evidence that the corrective action program and plant operating experience ensure that best practices for condition monitoring are implemented so that degraded conditions are identified and corrected prior to equipment failure.

2. In June 2013, during routine thermography inspection, a thermal anomaly was identified on a single phase, line side of the motor contactor for one of the primary containment chiller pump motors. The issue was entered into the corrective action program, and action was taken to tighten the bolted terminal connection. Followup thermography indicated that the elevated, actionable temperature delta was resolved by this action. Additional monitoring will be performed to ensure the maintenance corrective action was effective and provide further recommended actions as warranted. Although the primary containment chiller pump motor does not have an active intended function for license renewal, this issue provides objective evidence that the corrective action program and plant operating experience ensure that best practices for condition monitoring are implemented so that degraded conditions are identified and corrected prior to equipment failure.

3. In June 2013, a feedwater heater drain pump motor tripped on ground fault relay actuation. The pump and motor had been recently rebuilt and rewound, respectively, in April. The issue was entered into the corrective action program, and troubleshooting of the pump motor trip was performed. The apparent cause evaluation determined that the ground fault was due to failure of the insulation system (heat shrink) applied to the motor leads during the most recent maintenance. Contributing factors included termination configuration considerations such as limited termination box size and use of square versus rounded bolt lugs. Corrective actions included re-termination of the three phase motor leads and revision to termination drawings and specifications to address configuration issues. Although the feedwater heater drain pump motor does not have an active intended function for license renewal and the trip was not attributed to aging, this issue provides objective evidence that lessons learned from the corrective action program and plant operating experience are used to implement improvements in cable connection configuration and maintenance practices.

The operating experience relative to the new Electrical Cable Connections Not

Subject to 10 CFR 50.49 Environmental Qualification Requirements program did not identify an adverse trend in performance. The inspection methods to be implemented by the program have been proven effective in detecting aging effects including increased resistance of connection. Appropriate guidance for evaluation, repair, or replacement will be provided for locations where degradation is found. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the new Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will confirm that either increased resistance of connection is not occurring or that the existing preventive maintenance program is effective such that a periodic inspection program is not required.

Conclusion

The new Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will provide confirmation of the absence of increased resistance of connection in the metallic portions of electrical connections, prior to the period of extended operation. This one-time program will provide reasonable assurance that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.2 Plant-Specific Aging Management Programs

This section provides summaries of the plant-specific programs credited for managing the effects of aging.

B.2.2.1 Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program

Program Description

The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program is a new condition monitoring aging management program that performs periodic visual inspections of internal coatings of in scope components. The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program manages the loss of coating integrity in heat exchangers, piping, piping components, piping elements, strainer bodies, and tanks exposed to raw water, waste water, and lubricating oil environments.

The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program will include periodic visual inspections to verify the integrity of internal coatings designed to adhere to and protect the base metal. The maximum interval of subsequent coating inspections will comply with Table 4a of GALL Report AMP XI.M42 in draft LR-ISG-2013-01 dated January 6, 2014 (ADAMS Accession No. ML13262A442). The training and qualification of individuals performing coating inspections is conducted in accordance with ASTM international standards endorsed in RG 1.54.

Inspections are performed for signs of coating failures and precursors to coating failures including peeling, delamination, blistering, cracking, flaking, chipping, rusting, and mechanical damage. When acceptance criteria are not met, visual inspection is supplemented by additional testing such adhesion testing or other inspection technique as determined by the qualified inspector to accurately assess coating condition. Adhesion testing, when required by the coating specialist to determine the cause of failure, will be performed using international standards. A coatings specialist qualified to ASTM D-7108 will evaluate the results of coating inspections. Inspection results that do not satisfy established acceptance criteria are entered into the 10 CFR 50, Appendix B corrective action program. The corrective action program ensures that conditions adverse to quality are promptly corrected. Corrective actions may include coating repair or replacement prior to the component being returned to service.

The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program activities are implemented through station procedures and activities. The performance of periodic visual inspections assures the integrity of internal coatings considers the guidance on acceptance criteria included in Element 6 of GALL Report AMP XI.M42 in draft LR-ISG-2013-01. Visual inspections, repairs, replacement, or evaluations of internal coatings will provide reasonable assurance that the Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program will manage loss of coating integrity during the period of extended operation.

This new aging management program will be implemented prior to the period of extended operation. Baseline inspections will occur in the 10-year period prior to the period of extended operation.

Aging Management Program Elements

The results of an evaluation of each element against the 10 elements described in Appendix A of NUREG-1800, Standard Review Plan of License Renewal Applications for Nuclear Power Plants, are provided below.

Scope of Program – Element 1

The scope of the program is Service Level III and Service Level III augmented coatings installed on the internal surface of in scope components in the Essential Service Water System, Fire Protection System, Nonessential Service Water System, Plant Drainage System, and Reactor Core Isolation Cooling System that are exposed to raw water, waste water, and lubricating oil.

Internal coatings are an integral part of some in scope components. The intended function(s), as defined in the current licensing basis (CLB) of the coated component dictates whether the component has intended function(s) that meet the scoping criteria of 10 CFR 54.4(a). Service Level III and Service Level III augmented coatings are not evaluated as stand-alone components to determine whether they meet the scoping criteria of 10 CFR 54.4(a). All components within the scope of license renewal that have Service Level III or Service Level III augmented coating applied on internal surfaces are within the scope of the program.

Preventive Actions – Element 2

The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program is a condition monitoring program. This condition monitoring program does not rely on preventive actions, and therefore no prevention activities are specified.

Parameters Monitored/Inspected – Element 3

The program manages the aging effect loss of coating integrity by visual inspections intended to identify internal coatings that do not meet acceptance criteria. Physical testing is intended to identify potential delamination of the coating. Internal coatings are visually inspected for signs of coating failures and precursors to coating failures including peeling, delamination, blistering, cracking, flaking, chipping, rusting, and mechanical damage. These inspections ensure adequate aging management.

Detection of Aging Effects – Element 4

The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program is a new program for detecting the aging effect of loss of coating integrity before there is a loss of intended function(s) associated with the coated component. Internal coatings are visually inspected for signs of coating failures and precursors to coating failures including peeling, delamination, blistering, cracking, flaking, chipping, rusting, and mechanical damage. These inspections are appropriate to ensure that intended function(s) for the coated component will be adequately maintained for license renewal under all CLB design conditions.

Nuclear power plants are licensed based on redundancy, diversity, and defense-in-depth principles. A degraded or failed component reduces the reliability of the system, challenges safety systems, and contributes to plant risk. The effects of aging, such as loss of coating integrity, is managed to ensure availability of the component and downstream components to perform their intended function(s). This assures that all system level intended function(s), including redundancy, diversity, and defense-in depth remain consistent with the CLB during the period of extended operation.

Baseline Service Level III and Service Level III augmented internal coating inspections on in scope components will occur prior to the period of extended operation. Subsequent periodic inspections are based on an evaluation of the effect of an internal coating failure on the in scope component's intended function, potential problems identified during prior inspections, and known service life history. Subsequent inspection intervals are established by a coating specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 (hereinafter Revision 2 or later). However, inspection intervals will not exceed those in Table 4a, "Inspection Intervals for Service Level III (augmented) Coatings for Tanks, Piping, and Heat Exchangers," of GALL Report AMP XI.M42 in Draft LR-ISG-2013-01.

The extent of inspections is based on an evaluation of the effect of an internal coating failure on the in scope component's intended function(s), potential problems identified during prior inspections, and known service life history; however, the extent of inspection is not any less than the following for each coating material and environment combination. The internal coating environment includes both the environment inside the component and the metal to which the internal coating is attached. Inspection locations are selected based on susceptibility to degradation and consequences of failure.

- Heat exchangers, strainers, and tanks – all accessible internal surfaces.
- Piping – either inspect a representative 73 1-foot axial length circumferential segments of piping or 50 percent of the total length of each coating material and environment combination. The inspection surface includes the entire inside surface of the 1-foot sample. If geometric limitations impede movement of remote or robotic inspection tools, the number of inspection segments is increased in order to cover an equivalent of 73 1-foot axial length sections. For example, if the remote tool can only be maneuvered to view one-third of the inside surface, 219 feet of pipe is inspected.

Coating surfaces captured between interlocking surfaces (e.g., flanges) are not required to be inspected unless the joint has been disassembled to allow access for an internal coating inspection or other reasons. For areas not readily accessible for direct inspection, such as small pipelines, heat exchangers, and other equipment, consideration is given to the use of remote or robotic inspection tools.

The above recommendations for inspection of internal coatings may be omitted if the degradation of coatings cannot result in downstream effects such as reduction in flow, drop in pressure, or reduction in heat transfer for in scope components. However, the recommendations for inspections are met if corrosion rates or inspection intervals have been based on the integrity of the coatings. In this case, loss of coating integrity could result in unanticipated or accelerated corrosion rates of the base metal. Alternatively, if corrosion of the base material is the only issue related to coating degradation of the component, external wall thickness measurements can be performed to confirm the acceptability of the corrosion rate of the base metal.

The training and qualification of individuals involved in coating inspections and evaluating degraded conditions is conducted in accordance with an ASTM International standard endorsed in RG 1.54 including staff guidance associated with a particular standard.

Monitoring and Trending – Element 5

The program includes periodic visual inspections are performed to identify signs of coating failures and precursors to coating failures including peeling, delamination, blistering, cracking, flaking, chipping, rusting, and mechanical damage. The program will include a pre-inspection review of the results from previous two inspections of the in scope component, and any subsequent repair activities. During the periodic visual inspection activities, the as-found condition of the internal coating is documented in the completion remarks of the inspection work order. The results of previous inspections are used to determine changes in the condition of the coating. Trending of coating degradation is utilized to establish appropriate inspection frequencies. The frequency of the periodic visual inspections will not exceed those in Table 4a, of GALL Report AMP XI.M42 in Draft LR-ISG-2013-01 to assure internal coating degradation is identified before degradation of the base metal occurs such that intended function(s) of the coated component are maintained. A coatings specialist prepares or reviews the post-inspection report. The report includes a list and location of all areas evidencing deterioration; a prioritization of the repair areas into areas that must be repaired before returning the system to service; and areas where repair can be postponed to the next inspection. When corrosion of the base material is the only issue related to coating degradation of the component and external wall thickness measurements have been used in lieu of internal visual inspections of the coating, the corrosion rate of the base metal is trended. Coating defects are entered into the corrective action program for evaluation.

Acceptance Criteria – Element 6

Acceptance criteria for the Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program consider the guidance on acceptance criteria discussed in Draft LR-ISG-2013-01. Coating defects are entered into the corrective action program for evaluation. The internal coating defects will be evaluated to ensure that the component intended function(s) are maintained under all CLB design conditions prior to and during the period of extended operation. As necessary, visual inspection may be supplemented by additional testing such as adhesion testing or other inspection technique as determined by the inspector to accurately assess coating condition.

Acceptance criteria are as follows:

- Indications of peeling and delamination are evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff guidance associated with use of a particular standard. For coated surfaces that show evidence of delamination or peeling, physical testing is performed if required to assess the condition of the coating and where physically possible (i.e., sufficient room to conduct testing). The test consists of destructive or nondestructive adhesion testing using ASTM International standards. A minimum of three sample points adjacent to the defective area are tested.
- Blisters are evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff guidance associated with use of a particular standard. The cause of blisters needs to be determined if the blister is not repaired. Physical testing is conducted if required to assess the condition of the coating. If coatings are credited for corrosion prevention, the component's base material in the vicinity of the blister is inspected to determine if unanticipated corrosion has occurred.
- Indications such as cracking, flaking, and rusting are to be evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff guidance associated with use of a particular standard.
- As applicable, wall thickness measurements meet design minimum wall requirements.
- Adhesion testing results meet or exceed the degree of adhesion recommended in engineering documents specific to the coating and substrate.

Acceptance criteria consist of a discussion of the process for evaluating internal coatings. In the event coating defects are identified, the coating is evaluated to ensure that the component intended function(s) will be maintained under all CLB design conditions.

The acceptance criteria for this aging management program are undergoing an NRC review process, and when approved, the acceptance criteria for this aging management program will be part of the NRC-approved Generic Aging Lessons Learned (GALL) Report.

Corrective Actions – Element 7

Inspection results which identify internal coatings that do not satisfy established acceptance criteria are entered into the 10 CFR 50 Appendix B corrective action program for evaluation. The evaluation will be timely, and may include an apparent cause or root cause evaluation as well as corrective actions. If appropriate, corrective actions may include repair or replacement of the internal coating prior to the component being returned to service.

The corrective action program evaluation may permit analysis without repair or replacement of the internal coating. The analysis will ensure that the component intended function(s) will be maintained consistent with the CLB.

The corrective action program confirms that the corrective actions have been completed, effective, and done in a manner consistent with the condition monitoring program that is credited for aging management.

Confirmation Process – Element 8

Site quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B, Quality Assurance Program.

Administrative Controls – Element 9

Site quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B, Quality Assurance Program.

The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program is a new condition monitoring program developed for license renewal. As required, the FSAR supplement includes a summary description of the program and activities for managing the effects of aging for license renewal.

Operating Experience – Element 10

The following examples of operating experience provide objective evidence that the Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In March 2007, Engineering performed an inspection of the internals of the 2A diesel generator cooling water heat exchanger components exposed to raw water. All of the ceramalloy coating on the outlet side of the north dollar plate had separated from the base metal of carbon steel, and had come off in one piece. The ceramalloy coating on the inlet side of the north dollar plate was in pieces lying at the bottom of the waterbox. An estimated eight to nine tubes were obstructed by the failed ceramalloy coating. The ceramalloy coating on the north end bell was found in an acceptable condition.

Engineering performed an evaluation of the potential causes of the delamination. In April 2005, the north end bell and north dollar plate were replaced with new parts and coated with ceramalloy. The evaluation concluded that maintenance personnel most likely did not remove the cutting oils properly from the new dollar plate before applying the ceramalloy coating because it was not recognized that the new parts had been exposed to contaminants such as oils and chemical residues as part of the manufacturing process, and that those oils would prevent adhesion of the ceramalloy coating. The manufacturer's instructions and the engineering change (EC) document do state to use heat to remove contaminants prior to sandblasting and applying coating, but neither address that new parts have contaminants from the manufacturing process, and that sandblasting alone would not remove these contaminants.

One corrective action was to develop a maintenance procedure for the application of ceramalloy coatings on safety-related and nonsafety-related heat exchangers and strainers. Another corrective action was to communicate to maintenance work planners that safety-related coatings (Service Level III) work needs to meet the requirements established in procedures to assure that future coatings work is not performed by unqualified workers. Subsequent to the implementation of the corrective actions, no instances of ceramalloy delamination have occurred.

This operating experience example provides objective evidence that internal coatings are inspected for degradation, and that adverse conditions are identified and addressed in the corrective action program.

2. In January 2014, during an internal inspection of 1A reactor building closed cooling water heat exchanger, the system manager identified that portions of the ceramalloy coating on the north end cover of the heat exchanger were degraded. The ceramalloy coating on the north end cover showed signs of peeling and flaking where the end cover meets the divider plate. Additionally, although there was no flaking or peeling on the channel of the heat exchanger, it was noted that the ceramalloy coating on the channel had areas which were starting to wear thin, especially on the outlet side.

These as-found conditions were entered into the corrective action program, and the scope of the open work order was expanded while the 1A reactor building closed cooling water heat exchanger was still disassembled. The north end cover was refurbished by removing the existing ceramalloy coating, and recoating it with new ceramalloy coating. The channel areas that were thinning were evaluated, and it was determined that there was sufficient coating to last to the next internal inspection scheduled for 2017. Deferring recoating of the channel to the next internal inspection allows Maintenance the opportunity to plan and allocate the proper resources.

This operating experience example provides objective evidence that internal coatings are inspected for degradation, and that adverse conditions are identified and addressed in the corrective action program.

3. In September 2012, Maintenance noted that during preventive maintenance tasks on primary containment chillers, there is typically some erosion and thinning of the ceramalloy coating on the primary containment chiller condensers on the side exposed to service water. It was further noted that the erosion and thinning of the ceramalloy coating typically occurs in the middle of the dollar plate. Proper maintenance of the heat exchanger dollar plates often entails the time-consuming process of removing the existing ceramalloy coating, and recoating it with new ceramalloy coating, as well as welding to build-up areas thinned by machining and repairs. An issue was entered into the corrective action program recommending the procurement and coating of one or two spare dollar plates so that during future primary containment chiller maintenance windows the installed dollar plate can be removed and replaced with a spare ceramalloy coated dollar plate. Based on these

recommendations, spare condenser end covers were procured, and preventive maintenance work orders for primary containment chillers were revised with an activity to procure spare coated condenser end covers from the storeroom prior to the primary containment chiller window work.

This operating experience example provides objective evidence that the station strives for continuous improvement of the program, and opportunities for improvement are identified and addressed in the corrective action program.

The operating experience relative to the Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting loss of coating integrity. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. The program will be informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Consistency

The Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program aging management program will be consistent with the ten elements of an aging management program described in NUREG-1800, as modified by draft LR-ISG-2013-01.

Conclusion

The new Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program will provide reasonable assurance that the loss of coating integrity will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.3 NUREG-1801 Chapter X Aging Management Programs

This section provides summaries of the NUREG-1801 Chapter X programs credited for managing the effects of aging.

B.3.1.1 Fatigue Monitoring

Program Description

The Fatigue Monitoring aging management program is an existing preventive program that manages fatigue damage of reactor coolant pressure boundary and other components subject to the reactor coolant, treated water, steam, and air-indoor uncontrolled environments.

The Fatigue Monitoring program includes monitoring and tracking the number of critical thermal, pressure, and seismic transients to ensure that the cumulative usage factor (CUF) for each analyzed component does not exceed the design limit of 1.0 through the period of extended operation. The program includes monitoring the transients specified in Technical Specification 5.5.5, Component Cyclic or Transient Limits, UFSAR Table 5.2-4, Plant Events, and UFSAR Table 3.9-24, Applicable Thermal Transients. These transients are further defined in the following General Electric drawings: Unit 1 Reactor Vessel Thermal Cycles, Unit 2 Reactor Vessel Thermal Cycles, and Reactor Vessel Nozzle Thermal Cycles.

The program requires comparison of the actual event parameters to the applicable design transient definitions to ensure the actual transients are bounded by the design transients. The program includes counting the operational transients to ensure that the cumulative number of occurrences of each transient type is maintained below the most limiting number of cycles used in the Class 1 fatigue analyses, which is the cycle limit for each transient type. Maintaining the cumulative cycle counts below the analyzed cycle limits ensures that the CUF does not exceed 1.0. The fatigue analyses may be revised to account for increased numbers of cycles or increased transient severity as necessary to ensure that the CUF does not exceed 1.0.

Environmental fatigue analyses have also been prepared for the limiting locations within the Unit 1 and Unit 2 reactor pressure vessels and for ASME Class 1 piping systems. In some cases, reduced numbers of cycles were analyzed, based on 60-year projections that justify the reduced numbers of cycles. The Fatigue Monitoring program will be enhanced by incorporating the most limiting numbers of cycles for each transient type as administrative cycle limits. If an administrative cycle limit is approached, corrective actions are triggered, which may include revision of the affected environmental fatigue calculations and an expansion of the sample of locations evaluated for environmental fatigue if warranted.

NUREG-1801 Consistency

The Fatigue Monitoring aging management program will be consistent with the ten elements of aging management program X.M1, "Fatigue Monitoring," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Impose administrative transient cycle limits corresponding to the limiting numbers of cycles used in the environmental fatigue calculations. **Program Elements Affected: Program Scope (Element 1), Preventive Actions (Element 2), Parameters Monitored/Affected (Element 3), and Acceptance Criteria (Element 6)**

2. Evaluate the impact of the reactor coolant environment on Class 1 components including valves and pumps if they are more limiting than those considered in NUREG/CR-6260. **Program Elements Affected: Preventive Actions (Element 2), Parameters Monitored/Affected (Element 3), and Acceptance Criteria (Element 6)**

Operating Experience

The following examples of operating experience provide objective evidence that the Fatigue Monitoring program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. NUREG-0619 discusses several BWR plants that have experienced cracking in the feedwater nozzles and connecting feedwater spargers and provides several recommendations for inspections and design improvements. NUREG-0619 recommendations have been incorporated into the LSCS design, including elimination of the cladding on the nozzle inner diameter and the use of low-leakage triple-thermal-sleeve feedwater spargers. Also, the feedwater flow control system was designed with low-flow control capability during low-power operations, minimizing the number and severity of thermal cycles that reach the feedwater nozzles during these low-flow operations. Further, the reactor water cleanup system was designed to return flow to the reactor through both feedwater loops, mixing higher temperature water with the colder feedwater, minimizing the temperature difference between the blended fluid and the feedwater nozzles. These design features reduce the magnitude and frequency of thermal cycles and resulting thermal fatigue, and thereby minimize the likelihood of cracking in the feedwater nozzles. The lack of significant indications of cracking in the feedwater nozzles can be attributed in part to implementing the design recommendations defined in NUREG-0619. This

example provides objective evidence that industry experience and guidance have been incorporated into the plant design.

2. During the recent review of Fatigue Monitoring program records used to develop the 60-year cycle projections, it was determined that a number of startup and shutdown cycles that had originally been counted during the first few years of operation had been removed from the cycle counts in January 1997. This had been justified based upon misinterpretation of the guidance in the monitoring procedure regarding startup cycles. A corrective action program issue report was created to address the issue. Corrective actions included clarification of the of the transient definitions in the fatigue monitoring procedure (including specific references to the transient cycle diagrams), training of fatigue monitoring personnel regarding these definitions, and correction of the cumulative cycle counts based upon comparison of the operational data to the applicable transient cycle diagrams. As a result of correcting the cycle counts, the cumulative numbers of Unit 1 startup and shutdown cycles to-date exceed 80 percent of their respective design limits for the Unit 1 reactor pressure vessel only. This triggered further corrective action to ensure that no cumulative usage factors are permitted to exceed the design limit of 1.0. This included review of trending data that predicts the Unit 1 startup and shutdown cycles will reach the reactor vessel design limits at approximately year 50 of plant operation, based upon current rates of cycle occurrence. The Unit 2 cycle projections indicate the original design limits will not be exceeded in 60 years. The 60-year cycle projections for the Class 1 piping for both units do not exceed their design limits because the piping was analyzed for 400 startup and shutdown events.

3. A comparison of the fatigue monitoring procedure to the GE transient cycle diagrams determined that reactor core isolation cooling (RCIC) system injections are predicted to occur but are not directly monitored; rather the injections are included within other transient events that are monitored, including the Loss of Feedpump event. Since it is possible for these injections to occur more often than the number of times it is predicted to occur within the monitored events, direct monitoring of RCIC injections is being implemented. In addition, main steam relief valve (MSRV) actuations are used as inputs in a number of Class 1 fatigue analyses and were not included as monitored events in the program. As a result, the program was revised to identify all transient types that need to be directly monitored, added them to the list of monitored transients, determined the historical cycle counts, and established the appropriate cycle limits. This included RCIC injections and MSRV actuations.

The operating experience provides objective evidence that the Fatigue Monitoring program provides effective monitoring and trending of conditions that impact the fatigue life of plant components. Problems identified would not cause significant impact to the safe operation of plant components, and effective corrective actions are taken to maintain components within their design basis fatigue life limits. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of Fatigue Monitoring program will effectively identify degradation prior to loss of intended function.

Conclusion

The enhanced Fatigue Monitoring program will provide reasonable assurance that the cumulative fatigue damage aging effect will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.3.1.2 Concrete Containment Tendon Prestress

Program Description

The Concrete Containment Tendon Prestress aging management program is an existing condition monitoring program that is predicated on the ASME Section XI, Subsection IWL requirements. The current program is based on the 2001 Edition, through 2003 Addenda, of the ASME Boiler and Pressure Vessel Code, Section XI and includes confirmatory actions that monitor loss of containment tendon prestressing forces in an air-indoor uncontrolled environment. In accordance with 10 CFR 50.55a(g)(4), the ISI program is updated each successive 120-month inspection interval to comply with the requirements of the latest edition of the ASME Code specified 12 months before the start of the inspection interval. The ASME Code edition consistent with the provisions of 10 CFR 50.55a will be used during the period of extended operation.

The program requires measurement of prestressing forces on a sample from each tendon group (vertical and horizontal (hoop) tendon types) as specified in IWL-2400. One tendon from each tendon group is identified as a common, or control, tendon and is tested during each successive surveillance. The remaining tendons in the sample are obtained by randomly selecting tendons from amongst all of those that have not been previously examined. The initial sample size, which may be expanded if unacceptable conditions are found, is established as specified in Table IWL-2521-1.

Assessments of the results of the tendon prestressing force measurements are performed in accordance with ASME Section XI, Subsection IWL to confirm adequacy of the prestressing forces. The assessment consists of the establishment of acceptance criteria and trend lines. The acceptance criteria consist of predicted values of the forces in tendons and the minimum required prestressing force or value (MRV). The predicted value, or predicted lower limit (PLL), for tendons is developed consistent with the guidance presented in Regulatory Guide 1.35.1. As long as tendon forces remain above 95 percent of predicted values, there is definitive evidence that actual prestressing force loss is not significantly greater than that allowed for in the original design calculations.

Trend lines, one for each tendon group, are constructed using the individual measured tendon forces and represent the changes in prestressing forces with time. Trend line regression analysis is consistent with NRC Information Notice 99-10. As long as the trend lines do not fall below the MRV’s prior to the next scheduled surveillance, the tendon prestress force is acceptable. In accordance with the requirements of 10 CFR 50.55a(b)(2)(viii)(B), an evaluation will be performed if the trend lines predict the prestressing forces in the containment to be below the MRV before the next scheduled inspection.

A new analysis was performed for LaSalle County Station Units 1 and 2 based on actual measured forces to establish the trend of prestressing forces through the end of the period of extended operation. The analysis evaluates tendon force trends by tendon group (vertical and horizontal (hoop) tendon types) and shows that group forces will not fall below applicable predicted lower limits or minimum required values (MRV's) prior to the end of the period of extended operation. However, as tendon force trends may vary with time, the conclusions regarding long-term performance of the post-tensioning system are subject to change. As a result, the regression analyses are periodically updated to account for data acquired during future surveillances. Measured forces and trend lines are compared to predicted lower limits, and minimum required values and corrective actions are taken if unacceptable results or trends are identified.

Loss of containment tendon prestressing forces is a Time-Limited Aging Analysis (TLAA) evaluated in accordance with 10 CFR 54.21(c)(1)(iii). This program is credited for managing loss of containment tendon prestressing forces through the period of extended of operation.

NUREG-1801 Consistency

The Concrete Containment Tendon Prestress aging management program will be consistent with the ten elements of aging management program X.S1, "Concrete Containment Tendon Prestress," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancement will be implemented in the following program elements:

1. For each surveillance interval, trending lines will be updated through the period of extended operation as part of the regression analysis and compared to the predicted lower limit and minimum required values for each tendon group. **Program Element Affected: Monitoring and Trending (Element 5)**

Operating Experience

The following examples of operating experience provide objective evidence that the Concrete Containment Tendon Prestress program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In 2003 and 2008, LaSalle County Station performed the 25th year interval Subsection IWL examinations of the concrete containment tendons for Unit 1 and Unit 2 respectively. These examinations included testing to assess the loss of prestressing forces in select containment tendons for one unit as per the IWL-2421 examination requirements for sites with multiple plants, consistent with IWL requirements. The regression analyses document the results of

tendon prestress surveillance data through the 25th year interval. Trend lines were developed for each of the hoop and vertical tendon groups in accordance with NRC Information Notice 99-10, Attachment 3. In 2013, these analyses were revised to extend the trend lines for more than 60 years.

The results of the extended regression analyses developed in 2013, demonstrated that the predicted prestress for tendons at LaSalle County Station, Units 1 and 2, will remain above the respective minimum required values (MRV) for the period of extended operation. Therefore, monitoring of the results of containment tendon prestress to date indicate that the prestressing systems will continue to maintain their intended function through the period of extended operation without the need for tendon retensioning. The regression analyses for the hoop and vertical tendon groups will continue to be updated with individual measured results following each surveillance interval to ensure the intended function of the prestressing systems is maintained. If, as a result of subsequent updates to the regression analysis, the predicted prestress forces for a tendon group fall below the respective MRV, the condition will be entered into the corrective action program for evaluation and determination of appropriate corrective action. Additional details are provided in Section 4.5 of the LaSalle County Station, Units 1 and 2 License Renewal Application.

The operating experience relative to the Concrete Containment Tendon Prestress program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting loss of containment tendon prestress. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of the Concrete Containment Tendon Prestress program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is sufficient confidence that implementation of the Concrete Containment Tendon Prestress program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Concrete Containment Tendon Prestress program will provide reasonable assurance that the loss of prestress aging effect will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.3.1.3 Environmental Qualification (EQ) of Electric Components

Program Description

The Environmental Qualification (EQ) of Electric Components is an existing preventive program that manages the aging of electrical equipment within the scope of 10 CFR 50.49, “Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants.” The program includes electric equipment composed of various polymeric and metallic materials that is important to safety. This electric equipment is subject to adverse environments caused by heat, radiation, oxygen, moisture, or voltage. The program establishes, demonstrates, and documents the level of qualification, qualified configurations, maintenance, surveillance and replacements necessary to meet 10 CFR 50.49. A qualified life is determined for equipment within the scope of the program and appropriate mitigative actions such as replacement or refurbishment are taken prior to or at the end of the qualified life of the equipment so that the aging limit is not exceeded. The various aging effects addressed by this program are adequately managed so that the intended functions of components within the scope of 10 CFR 50.49 are maintained consistent with the current licensing basis during the period of extended operation.

NUREG-1801 Consistency

The Environmental Qualification (EQ) of Electric Components aging management program is consistent with the ten elements of aging management program X.E1, "Environmental Qualification (EQ) of Electric Components," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Environmental Qualification (EQ) of Electric Components program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In June 2013, a Focused Area Self-Assessment (FASA) was completed for the Environmental Qualification (EQ) of Electric Components program. The FASA focused on determining if EQ maintenance requirements are consistent with input information from the vendor, relevant corporate/station maintenance programs, and operating experience, specifically for motors. The assessment included review of five EQ binders for medium and low voltage motors, vendor manuals, maintenance procedures, maintenance history, and an industry survey. The FASA concluded that the EQ maintenance requirements are

consistent with source documentation and industry practices. Six recommendations for document improvements, extent of condition and new periodic holistic reviews, and qualification re-analysis for a 60 year life were identified and implemented. There were no deficiencies. The FASA is documented in the corrective action program. This operating experience provides objective evidence that the Environmental Qualification (EQ) of Electric Components program undergoes periodic self-assessment and improvement and will continue to adequately manage electrical components subject to the requirements of environmental qualification through the period of extended operation.

2. In February 2013, a condition report in the corrective action program was written for the EQ service life of inboard main steam isolation valve (MSIV) limit switches, specifically to assess the impact of actual recorded ambient temperatures. The corrective action program contains other similar condition reports, distributed over the past 10 years, documenting additional occurrences of higher than expected temperatures at MSIV limit switches and potential impact to MSIV limit switch qualified life, if any. Limit switch temperatures are monitored by surveillances which are controlled by station procedures. The surveillance monitors the limit switch metal temperatures. Subsequent evaluation of the measured temperatures may result in the need to adjust qualified life based on observed actual environmental conditions and schedule the subsequent replacement of MSIV limit switches, prior to exceeding qualified life. The associated surveillance is contained in station procedures. This operating experience provides objective evidence that the existing Environmental Qualification (EQ) of Electric Components program along with temperature monitoring and the corrective action program assure that these critical temperatures are monitored and evaluated and that the associated MSIV limit switches are replaced before they exceed their qualified life.

3. In May and June 2011, a periodic Focused Area Self-Assessment (FASA) was completed for the Environmental Qualification (EQ) of Electric Components program. The FASA assessed the technical program elements to verify that EQ components are installed and maintained effectively in compliance with EQ documentation. It was concluded that the program meets requirements and is satisfactorily implemented at LSCS. Recommendations were made for providing links between preventive maintenance and equipment numbers, requesting recurring EQ program training for system managers, and reviewing temperature data for main steam isolation valve temperatures for impact on qualified life. Additionally, documentation deficiencies for six EQ Binders and associated pre-defines were identified and corrected. The FASA is documented in the corrective action program. This operating experience provides objective evidence that the Environmental Qualification (EQ) of Electric Components program undergoes periodic self-assessment and improvement and will continue to adequately manage electrical components subject to the requirements of environmental qualification through the period of extended operation.

4. In May 2011 an applicability evaluation was performed and entered in the corrective action program for industry operating experience documented in Commission findings for the EQ program at a pressurized water reactor. The

findings included the non-replacement of plastic shipping plugs, improper torquing of housing covers for transmitters, and identified installations for valve actuators and penetration assemblies that did not match evaluated or tested configurations. Associated LSCS components, including make, model, and installation configurations; previous LSCS corrective action program findings; and procedural requirements for component maintenance were reviewed. It was determined that LSCS specific equipment, configurations, results of previous walkdowns and procedural requirements supported concluding that there were no similar deficiencies in the LSCS EQ program or installed plant equipment. This LSCS applicability evaluation provides objective evidence that the Environmental Qualification (EQ) of Electric Components program is assessed against industry operating experience for subsequent program improvements or corrections, as applicable.

The operating experience relative to the Environmental Qualification (EQ) of Electric Components program did not identify an adverse trend in performance. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Periodic self-assessments of the Environmental Qualification (EQ) of Electric Components program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that continued implementation of the Environmental Qualification (EQ) of Electric Components program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The existing Environmental Qualification (EQ) of Electric Components program provides reasonable assurance that the various aging effects aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

APPENDIX C
RESPONSE TO BWRVIP LICENSE RENEWAL APPLICANT ACTION ITEMS

Of the BWRVIP reports credited within LaSalle license renewal aging management programs, the following include NRC safety evaluation reports (SERs) that include action items applicable to license renewal applicants:

- BWRVIP-18-R1-A, BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines
- BWRVIP-25, BWR Core Plate Inspection and Flaw Evaluation Guidelines
- BWRVIP-26-A, BWR Top Guide Inspection and Flaw Evaluation Guidelines
- BWRVIP-27-A, BWR Standby Liquid Control System/Core Plate dP Inspection and Flaw Evaluation Guidelines
- BWRVIP-38, BWR Shroud Support Inspection and Flaw Evaluation Guidelines
- BWRVIP-41, BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines (Revision 3)
- BWRVIP-42-A, BWR LPCI Coupling Inspection and Flaw Evaluation Guidelines
- BWRVIP-47-A, BWR Lower Plenum Inspection and Flaw Evaluation Guidelines
- BWRVIP-48-A, BWR Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines (Credited in BWR Vessel ID Attachment Weld program)
- BWRVIP-49-A, BWR Instrument Penetration Inspection and Flaw Evaluation Guidelines (Credited in BWR Penetrations program)
- BWRVIP-74-A, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guideline for License Renewal
- BWRVIP-76-A, BWR Core Shroud Inspection and Flaw Evaluation Guidelines

License renewal applicant action items identified in the corresponding SERs for each of the above BWRVIP reports are addressed in the following tables. BWRVIP reports without SERs for license renewal do not have action items and are therefore not included in the tables.

It is recognized that the first three action items from each of the license renewal SERs applicable to the above BWRVIP reports are fundamentally identical. For that reason they are combined in the table and addressed together.

Common Action Items from BWRVIP-18- R1-A, -25, -26-A, -27-A, -38, -41 R3, -42-A, -47-A, -48-A, -49-A, -74-A, -76-A	
Action Item Description	**LaSalle Response**
BWRVIP-All (1) The license renewal applicant is to verify that its plant is bounded by the report. Further, the renewal applicant is to commit to programs described as necessary in the BWRVIP reports to manage the effects of aging of subject components during the period of extended operation. Applicants for license renewal will be responsible for describing any such commitments and identifying how such commitments will be controlled. Any deviations from the aging management programs within these BWRVIP reports described as necessary to manage the effects of aging during the period of extended operation and to maintain the functionality of the components or other information presented in the reports, such as materials of construction, will have to be identified by the renewal applicant and evaluated on a plant-specific basis in accordance with 10 CFR 54.21(a)(3) and (c)(1).	The BWRVIP reports applicable to LaSalle have been reviewed and LaSalle aging management programs have been verified to be bounded by the reports. Additionally, LaSalle is committed to programs described as necessary in the BWRVIP reports to manage the effects of aging during the period of extended operation. These commitments are included in LRA Appendix A, Section A.5. If, upon review of a BWRVIP approved guideline, it is determined that known deviations to full compliance are warranted, the NRC will be notified of the deviation within 45 days of the receipt of NRC final approval of the guideline. Commitments are administratively controlled in accordance with the requirements of 10 CFR 50, Appendix B.
BWRVIP-All (2) 10 CFR 54.21(d) requires that an FSAR supplement for the facility contains a summary description of the programs and activities for managing the effects of aging and the evaluation of TLAAs for the period of extended operation. Those applicants for license renewal referencing the applicable BWRVIP report shall ensure that the programs and activities specified as necessary in the applicable BWRVIP reports are summarily described in the FSAR supplement.	The UFSAR supplements are included in LRA Appendix A. The FSAR supplements include a summary description of the programs and activities specified as necessary for managing the effects of aging per the BWRVIP reports.

<table>
<tr><th>Action Item Description</th><th>LaSalle Response</th></tr>
<tr><td>BWRVIP-All (3)

10 CFR 54.22 requires that each application for license renewal include any technical specification changes (and the justification for the changes) or additions necessary to manage the effects of aging during the period of extended operation as part of the renewal application. The applicable BWRVIP reports may state that there are no generic changes or additions to technical specifications associated with the report as a result of its aging management review and that the applicant will provide the justification for plant-specific changes or additions. Those applicants for license renewal referencing the applicable BWRVIP report shall ensure that the inspection strategy described in the reports does not conflict with or result in any changes to their technical specifications. If technical specification changes or additions do result, then the applicant must ensure that those changes are included in its application for license renewal.</td><td>There are no changes to technical specifications that are required to meet the requirements of the BWRVIP reports during the period of extended operation. Reference LRA Appendix D.</td></tr>
<tr><td colspan="2">Additional Action Items</td></tr>
<tr><td colspan="2">BWRVIP-18- Revision 1-A, Core Spray Internals Inspection and Flaw Evaluation Guidelines</td></tr>
<tr><td>Action Item Description</td><td>LaSalle Response</td></tr>
<tr><td>BWRVIP-18 (4)

Applicants referencing the BWRVIP-18 report for license renewal should identify and evaluate any potential TLAA issues which may impact the structural integrity of the subject RPV core spray internal components.</td><td>Cumulative fatigue damage is a potential TLAA issue identified for core spray system piping and components internal to the reactor vessel. TLAA is used to manage cumulative fatigue damage for these core spray piping and components as discussed in LRA Section 4.3.4.</td></tr>
</table>

BWRVIP-25 Core Plate Inspection and Flaw Evaluation Guidelines	
Action Item Description	**LaSalle Response**
BWRVIP-25 (4) Due to susceptibility of the rim hold-down bolts to stress relaxation, applicants referencing the BWRVIP-25 report for license renewal should identify and evaluate the projected stress relaxation as a potential TLAA issue.	Preload of the rim hold-down bolts is required to prevent lateral motion of the core plate for those plants that do not have core plate wedges installed. Stress relaxation of the RPV core plate rim hold-down bolts has been identified as a TLAA issue as evaluated in LRA Section 4.2.8.
BWRVIP-25 (5) Until such time as an expanded technical basis for not inspecting the rim hold-down bolts is approved by the staff, applicants referencing the BWRVIP-25 report for license renewal should continue to perform inspections of the rim hold-down bolts.	The BWRVIP recognizes that it is not possible to implement meaningful inspections using the inspection methods recommended in BWRVIP-25. The BWRVIP is addressing this issue and intends to develop revised guidance. The BWRVIP recommendation to document deviation from BWRVIP-25 inspection guidelines of the core plate hold down bolts is currently being implemented. A BWRVIP Deviation Disposition is in place until December 31, 2015, or until the NRC approves revised BWRVIP guidance, whichever occurs first. Therefore, inspection of the core plate rim hold down bolts will be in compliance with BWRVIP guidance prior to and through the period of extended operation.

BWRVIP-26-A Top Guide Inspection and Flaw Evaluation Guidelines	
Action Item Description	**LaSalle Response**
BWRVIP-26-A (4) Due to IASCC susceptibility of the subject safety-related components, applicants referencing the BWRVIP-26 report for license renewal should identify and evaluate the projected accumulated neutron fluence as a potential TLAA issue.	The RAMA fluence evaluation for reactor internals performed for license renewal determined that the neutron fluence threshold for IASCC susceptibility has been exceeded. Fluence for reactor internals is evaluated as a TLAA in LRA Section 4.2.1. No TLAA has been identified to manage aging effects. During the period of extended operation, the aging of the top guide will be managed by inspections conducted as part of the BWR Vessel Internals (B.2.1.9) program per guidance provided in BWRVIP-183. The program requires that at least 10 percent of the grid beam cells containing control rod blades will be inspected every 12 years. The inspections are performed using the enhanced visual inspection technique, EVT-1. The program also allows for inspections to be performed using UT once it becomes available. Inspections will continue to be performed as described above during the period of extended operation.

BWRVIP-27-A Standby Liquid Control System/Core Plate dP Inspection and Flaw Evaluation Guidelines	
Action Item Description	**LaSalle Response**
BWRVIP-27-A (4) Applicants referencing the BWRVIP-27-A report for license renewal should identify and evaluate the projected fatigue cumulative usage factors as a potential TLAA issue.	Cumulative fatigue damage is a potential TLAA issue identified for the SLC system/core plate dP penetration. TLAA is used to manage cumulative fatigue damage for the SLC system/core plate dP penetration as discussed in LRA Sections 4.3.1 and 4.3.3.

BWRVIP-42-A, BWR LPCI Coupling Inspection and Flaw Evaluation Guidelines.

Action Item Description	LaSalle Response
BWRVIP-42-A (4) Applicants referencing the BWRVIP-42 report for license renewal should identify and evaluate any potential TLAA issues which may impact the structural integrity of the subject RPV internal components	Cumulative fatigue damage is a potential TLAA issue identified for the LPCI coupling. TLAA is used to manage cumulative fatigue damage for the LPCI coupling as discussed in LRA Section 4.3.4.
BWRVIP-42-A (5) The BWRVIP committed to address development of the technology to inspect inaccessible welds and to have the individual LR applicant notify the NRC of actions planned. Applicants referencing BWRVIP-42 report for license renewal should identify the action as open and to be addressed once the BWRVIP's response to this issue has been reviewed and accepted by the staff.	Inspection of the LPCI coupling is performed in accordance with guidelines described in BWRVIP-42-A. Portions of the 45-12, Sleeve Flange to Thermal Sleeve Weld at RPV, are inaccessible. Similar accessible welds have been identified and inspected with no flaws identified on either unit. The program for inspection of the LPCI coupling includes the guidance within BWRVIP-42-A for expansion of inspection scope, and to determine an assumed leakage from any inaccessible weld, if a flaw is identified in any similar accessible welds. If 75 percent of the accessible similar welds are cracked, then a method must be developed to inspect the inaccessible weld.

BWRVIP-47-A, BWR Lower Plenum Inspection and Flaw Evaluation Guidelines

Action Item Description	LaSalle Response
BWRVIP-47-A (4) Due to fatigue of the subject safety-related components, applicants referencing the BWRVIP-47 report for LR should identify and evaluate the projected CUF as a potential TLAA issue.	Fatigue usage is considered a TLAA for reactor vessel incore instrumentation penetrations and CRD penetrations. This is addressed in LRA Sections 4.3.1 and 4.3.4.

BWRVIP-74-A, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines	
Action Item Description	**LaSalle Response**
BWRVIP-74-A (4) The staff is concerned that leakage around the reactor vessel seal rings could accumulate in the VFLD lines, cause an increase in the concentration of contaminants and cause cracking in the VFLD line. The BWRVIP-74 report does not identify this component as within the scope of the report. However, since the VFLD line is attached to the RPV and provides a pressure boundary function, LR applicants should identify an AMP for the VFLD line.	The vessel flange leak detection (VFLD) nozzles and piping are included in the scope of scope of license renewal. The Unit 1 nozzle is made from carbon steel, and the Unit 2 nozzle is a penetration made from nickel alloy. Cracking of the Unit 2 nozzle is managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) and Water Chemistry (B.2.1.2) programs. The VFLD piping on both units is fabricated from carbon steel material, and is therefore not susceptible to cracking. The VFLD piping is managed by the One-Time Inspection (B.2.1.21) and Water Chemistry (B.2.1.2) programs for loss of material. Reference LRA Section 3.1.2.2.4.
BWRVIP-74-A (5) LR applicants shall describe how each plant-specific aging management program addresses the following elements: (1) scope of program, (2) preventative actions, (3) parameters monitored and inspected, (4) detection of aging effects, (5) monitoring and trending, (6) acceptance criteria, (7) corrective actions, (8) confirmation process, (9) administrative controls, and (10) operating experience.	There are no plant-specific aging management programs credited for managing aging of reactor pressure vessel components. Descriptions of the aging management programs credited for managing the reactor pressure vessel are described in Appendix B. These descriptions include any program element that deviates from the NUREG-1801 program element, and any enhancements that are required to meet NUREG-1801 requirements.

Action Item Description	LaSalle Response
BWRVIP-74-A (6) The staff believes inspection by itself is not sufficient to manage cracking. Cracking can be managed by a program that includes inspection and water chemistry. BWRVIP-29 describes a water chemistry program that contains monitoring and control guidelines for BWR water that is acceptable to the staff. BWRVIP-29 is not discussed in the BWRVIP-74 report. Therefore, in addition to the previously discussed BWRVIP reports, LR applicants shall contain water chemistry programs based on monitoring and control guidelines for reactor water chemistry that are contained in BWRVIP-29.	The Water Chemistry (B.2.1.2) aging management program is consistent with NUREG-1801, Revision 2, Chapter, XI.M2, "Water Chemistry", and meets the requirements of the latest BWRVIP Water Chemistry guidelines to help ensure the long-term integrity of the reactor vessel and internals. Aging management programs that utilize inspections to perform condition monitoring of reactor pressure vessel and internal components to identify cracking also credit the Water Chemistry program to mitigate cracking of reactor vessel components, including the BWR Vessel Internals (B.2.1.9), BWR Vessel ID Attachment Welds (B.2.1.4), BWR Penetrations (B.2.1.8), and BWR Stress Corrosion Cracking (B.2.1.7) programs.
BWRVIP-74-A (7) LR applicants shall identify their vessel surveillance program, which is either an ISP or plant-specific in-vessel surveillance program, applicable to the LR term.	The Reactor Vessel Surveillance (B.2.1.20) program describes the Integrated Surveillance Program (ISP) that is applicable for the license renewal term.
BWRVIP-74-A (8) LR applicants should verify that the number of cycles assumed in the original fatigue design is conservative to assure that the estimated fatigue usage for 60 years of plant operation is not underestimated. The use of alternative actions for cases where the estimated fatigue usage is projected to exceed 1.0 will require case-by-case staff review and approval. Further, a LR applicant must address environmental fatigue for the components listed in the BWRVIP-74 report for the LR period.	The Metal Fatigue Analyses associated with the reactor vessel are evaluated as TLAAs in LRA Section 4.3.1. Fatigue TLAAs are managed by the Fatigue Monitoring (B.3.1.1) program to ensure that cumulative fatigue usage will not exceed 1.0. Environmental fatigue for reactor vessel components is evaluated in LRA Section 4.3.3.

Action Item Description	LaSalle Response
BWRVIP-74-A (9) Appendix A to the BWRVIP-74 report indicates that a set of P-T curves should be developed for the heat-up and cool-down operating conditions in the plant at a given EFPY in the LR period.	P-T limit curves will be developed per 10 CFR 50, Appendix G requirements for the period of extended operation as discussed in LRA Section 4.2.4.
BWRVIP-74-A (10) To demonstrate that the beltline materials meet the Charpy USE criteria specified in Appendix B of the report, the applicant shall demonstrate that the percent reduction in Charpy USE for their beltline materials are less than those specified for the limiting BWR/3-6 plates and the non-Linde 80 submerged arc welds and that the percent reduction in Charpy USE for their surveillance weld and plate are less than or equal to the values projected using the methodology in RG 1.99, Revision 2.	Charpy upper-shelf energy (USE) values for the period of extended operation were determined using methods consistent with RG 1.99, Revision 2. This is discussed as a TLAA in LRA Section 4.2.2.
BWRVIP-74-A (11) To obtain relief from the inservice inspection of the circumferential welds during the LR period, the BWRVIP report indicates each licensee will have to demonstrate that (1) at the end of the renewal period, the circumferential welds will satisfy the limiting conditional failure frequency for circumferential welds in the Appendix E for the staff's July 28, 1998, SER, and (2) that they have implemented operator training and established procedures that limit the frequency of cold overpressure events to the amount specified in the staff's FSER.	At the end of the renewal period, the circumferential welds for each unit will satisfy the limiting conditional failure frequency for circumferential welds in the staff's July 28, 1998, FSER. Relief from the inservice inspection of the circumferential welds during the period of extended operation is discussed in LRA Section 4.2.6.

Action Item Description	LaSalle Response
BWRVIP-74-A (12) As indicated in the staff's March 7, 2000, letter to Carl Terry, a LR applicant shall monitor axial beltline weld embrittlement. One acceptable method is to determine that the mean RT_{NDT} of the limiting axial beltline weld at the end of the period of extended operation is less than the values specified in Table 1 of this FSER.	The Axial Weld Failure Probability Assessment Analyses has been identified as a TLAA as discussed in LRA Section 4.2.5. The TLAA evaluation shows that the mean RT_{NDT} of the limiting axial beltline weld for each unit at the end of the period of extended operation is less than the value specified in Table 1 of BWRVIP-74-A FSER as shown in LRA Table 4.2.5-1 and Table 4.2.5-2.
BWRVIP-74-A (13) The Charpy USE, P-T limit, circumferential weld and axial weld RPV integrity evaluations are all dependent upon the neutron fluence. The applicant may perform neutron fluence calculations using staff approved methodology or may submit the methodology for staff review. If the applicant performs the neutron fluence calculation using a methodology previously approved by the staff, the applicant should identify the NRC letter that approved the methodology.	An NRC approved methodology was used to determine fluence during the period of extended operation, as discussed in LRA Section 4.2.1. The RAMA Methodology used was approved within the SER for BWRVIP-114, 115, 117 and 121.
BWRVIP-74-A (14) Components that have indications that have been previously analytically evaluated in accordance with sub-section IWB-3600 of Section XI to the ASME Code until the end of the 40-year service period shall be re-evaluated for the 60-year service period corresponding to the LR term.	There are no components within the ASME Code Class 1 reactor coolant pressure boundary with indications that have been previously analytically evaluated until the end of the 40-year service period.

BWRVIP-76-A, BWR Core Shroud Inspection and Flaw Evaluation Guidelines	
Action Item Description	**LaSalle Response**
BWRVIP-76-A (4) The applicant shall reference the NRC staff-approved TRs BWRVIP-14-A, BWRVIP-99 (when approved) and BWRVIP-100-A in their RVI AMP. The applicant shall make a statement in their LRA that the crack growth rate evaluations and fracture toughness values specified in these reports shall be used for cracked core shroud welds that are exposed to the neutron fluence values that are specified in these TRs. The applicant shall confirm that they will incorporate any emerging inspection guidelines developed by the BWRVIP for these welds.	The BWR Vessel Internals (B.2.1.9) program implements BWRVIP-76-A requirements including guidance within BWRVIP-76-A Section D to use current NRC-approved BWRVIP guidance to determine crack growth rates and fracture toughness values. The BWR Vessel Internals program includes reference to BWRVIP-14-A, BWRVIP-99-A, and BWRVIP-100-A for evaluation of crack growth. The current guidance references BWRVIP-14-A and BWRVIP-99-A for crack growth rates and BWRVIP-100-A for fracture toughness values. The implementing procedures for the BWR Vessel Internals program include guidance to incorporate new guidance within new or revised BWRVIP reports. This assures that any emerging inspection guidelines developed by the BWRVIP for these core shroud welds will be incorporated into the program.
BWRVIP-76-A (5) LR applicants that have core shrouds with tie rod repairs shall make a statement in their AMP associated with RVI components that they have evaluated the implications of the Hatch Unit 1 tie rod repair cracking on their units and incorporated revised inspection guidelines, if any, developed by the BWRVIP.	The core shrouds have not been modified to include tie rod repairs.

Action Item Description	LaSalle Response
BWRVIP-76-A (6) The NRC staff's guidance in Table IV.B1 of the GALL Report lists two potentially applicable aging effects (i.e., in addition to cracking) for generic BWR reactor vessel internal components (including BWR core shroud and core shroud repair assembly components) that are made from either stainless steel (including CASS) or nickel alloy: (1) loss of material due to pitting and crevice corrosion (Refer to GALL AMR IV.B1-15), and cumulative fatigue damage (Refer to AMR Item IV.B1-14). BWR LR applicants will need to assess their designs to see if the generic guidelines for managing cumulative fatigue damage in GALL AMR item IV.B1-14 and for management of loss of material due to pitting and crevice corrosion in GALL AMR IV.B1-15 are applicable to the design or their core shroud components (including welds) and any core shroud assembly components that have been installed through a design modification of the plant. If these aging affects are applicable to the design of these components as a result of exposing them to a reactor coolant with integrated neutron flux environment, applicants for license renewal will need to: (1) identify the aging effects as aging effects requiring management (AERM) for the core shrouds and for their core shroud assembly components if a repair design modification has been implemented, and (2) identify the specific aging management programs or time-limited aging analyses that will be used to manage these aging effects during the period of extended operation. Refer to License Renewal Applicant Action Item 7) for additional guidance on identifying the AERMs for core shroud components or core shroud repair assembly components that are made from materials other than stainless steel (including CASS) or nickel alloy.	The core shrouds (including welds) are fabricated from stainless steel and nickel alloy material. Cumulative fatigue damage for the core shroud has been identified as a TLAA as discussed in LRA Section 4.3.4. In addition to cracking, loss of material due to pitting and crevice corrosion and cumulative fatigue damage are identified as aging effects requiring aging management. The BWR Vessel Internals (B.2.1.9) and Water Chemistry (B.2.1.2) programs will be used to manage cracking and loss of material due to pitting and crevice corrosion during the period of extended operation.

Action Item Description	LaSalle Response
BWRVIP-76-A (7) For BWR LRAs identification of AERMs for core shroud components or core shroud repair assembly components that are made from materials other than stainless steel (including CASS) or nickel alloy will need to be addressed on a plant-specific basis that is consistent with the Note format criteria for plant-specific AMR items in the latest NRC-approved version TR NEI-95-10.	The core shrouds (including welds) are fabricated from stainless steel and nickel alloy material. No core shroud repair assembly components have been added. Therefore, core shroud components that are made from materials other than stainless steel or nickel alloy are not addressed.
BWRVIP-76-A (8) LR applicant shall reference the NRC staff-approved topical reports BWRVIP-99 and BWRVIP-100-A in their RVI components AMP.	The BWR Vessel Internals (B.2.1.9) program implements BWRVIP-76-A requirements including guidance within BWRVIP-76-A Section D to use current NRC-approved BWRVIP guidance to determine crack growth rates and fracture toughness values. The current guidance includes letter 2012-074 from Randy Stark, EPRI, BWRVIP Program Manager, to All BWRVIP Committee Members, Superseded “Needed” Guidance Regarding Crack Growth Assumptions, March 22, 2012 for evaluation of crack growth rates in austenitic stainless steel and nickel based alloy components. This guidance is consistent with BWRVIP-14-A and BWRVIP-99-A. The implementing procedures for the BWR Vessel Internals program include reference to applicable BWRVIP reports including BWRVIP-14-A, BWRVIP-99-A, and BWRVIP-100-A for evaluation of crack growth.

APPENDIX D - TECHNICAL SPECIFICATION CHANGES

10 CFR 54.22 requires that an application for license renewal include any Technical Specification changes or additions necessary to manage the effects of aging during the period of extended operation.

No Technical Specification changes or additions were identified as necessary to manage the effects of aging during the period of extended operation and as such no Technical Specification changes or additions are included with this License Renewal Application.